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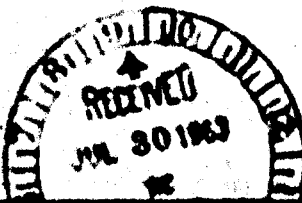
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(1) MIDAS
TRACKING AND CONTROL CENTER
FACILITIES CRITERIA.

PART II, BASIS FOR DESIGN
BUILDINGS AND STRUCTURES.

LAC Purchase Order No. 28-149



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TRACKING AND CONTROL CENTER
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PART II, BASIS FOR DESIGN
BUILDINGS AND STRUCTURES.

~~LAC Purchase Order No. 8419~~

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Change of Contract Notice No. 12, dated 17 November 1960

Prepared in Conjunction with
Lockheed Missiles and Space Division
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TRACKING AND CONTROL CENTER

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FOREWORD

This report constitutes Part II ~~of the~~ basis for design, buildings and structures, of the facilities criteria for a MIDAS Tracking and Control Center prepared for the MIDAS Program, under Lockheed Aircraft Corporation, Missiles and Space Division, Subcontract Purchase Order No. 28-149, by The Ralph M. Parsons Company.

This document was developed from the design parameters as set forth in "MIDAS Tracking and Control Center Facilities Criteria, Part I, Equipment and Operation Concepts", LMSD-447741 (prepared by LMSD Department 61-91, Base Engineering), and through direct consultation with LMSD representatives. This report is submitted under Contract AF 04(647)-595 in compliance with Change of Contract Notice No. 12 dated 17 November 1960.

The data developed in this report includes the design analysis, criteria, and definitive drawings for the technical structures required for an operational MIDAS Tracking and Control Center.

Site planning is limited to location of the technical structures only, and does not include development of exterior utility distribution systems or utilities buildings, roads or parking areas, power generating plant, master distribution system substation, security check houses, conduit systems for instrumentation and communications cabling, or disposition or alteration of existing site development.

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SECTION 1

SCOPE

1.1 NAME OF FACILITY

MIDAS Tracking and Control Center.

1.2 AREAS AND COMPONENTS

The areas required for this technical facility include three Receiving and Command Areas and an Operations and System Control Area.

1.2.1 Areas

- a. Each Receiving and Command Area includes a Satellite Communications Building (SCB) attached by an enclosed passageway to a Radome Support Structure which encircles and encloses an antenna on an Antenna Support Structure.
- b. The Operations and System Control Area includes a Central Operations and System Control Building (COSCB).
- c. The technical facilities should be enclosed by a security fence controlled by a Security Check House. (This work is not a part of these criteria).

1.2.2 Components. The components required include transmitting and receiving equipment in the SCB's; Data Analysis, Data Processing, System Control, Tracking Control, communications equipment, and administration and support facilities in the COSCB.

1.2.2.1 Each Satellite Communications Building, under control of the Central Operations and System Control Building, has the capability of transmission and reception of RF signals.

- a. The Satellite Communications Buildings house the equipment for telemetry reception, and the facilities required for the attendant personnel. The essential antenna locations as sited, the requirements for preventing reflection of RF signals from the satellite and signal interference from the antenna, and the instrumentation and communication cable runs between these buildings and the COSCB established the siting of these buildings.
- b. An Antenna Support Structure must be provided for each antenna.
- c. Each Radome Support Structure supports a radome, furnished by others, to form a weather protection envelope for the antenna. The radome must allow transmission and reception of RF signals within tolerable signal degradation limits.

1.2.2.2 The Central Operations and System Control Building (COSCB) houses the equipment necessary to perform the continuous functions of receiving, recording, formatting, normalizing and displaying all MIDAS system data from the three Satellite Communications Buildings (SCB's) of the Tracking and Control Center (TCC), the geographically dispersed Readout Stations, the Launch Operations Center (LOC) and the MIDAS Operations Center (MOC); to control the MIDAS System Operations under the over-all direction of the MOC, including transmitting satellite acquisition data to the Readout Stations; and to temporarily operate the MIDAS system without the MOC, including assessing the alarm status, transmitting alarm information to the using agencies, and directing the replacement of nonfunctioning or degraded satellites. In addition, this building houses the technical, administration and operating personnel required to perform these functions.

1.2.3 Functions. The Station function and functions of each building are included in Part I, Equipment and Operation Concepts, LMSD-447741, of these criteria.

SECTION 2

PURPOSE OF BASIS FOR DESIGN

2.1 PURPOSE

The purpose of this Basis for Design is to provide the information necessary to serve as a basis for the preparation of the final design of the MIDAS Tracking and Control Center Facilities.

2.2 ASSUMPTIONS AND ADDITIONAL DATA REQUIRED

Because of the accelerated program schedule of the MIDAS Tracking and Control Center, and the limited construction lead time, these criteria were required prior to resolution of a number of technical problems. In lieu of definitive data on these aspects, assumptions were used, and it is probable that revisions will be required after the speculative areas are defined. The following is a representative list of unresolved areas and unavailable data for which assumptions were made.

- a. These criteria were developed using available design drawings (SAMOS Project), and miscellaneous site data, reference Paragraph 3.2.

Typical of miscellaneous site data which should be verified prior to initiation of final design are water analysis, availability and operating pressures of the water supply system, adequacy of existing sewage system, et cetera.

The availability and reliability of existing electric power service must be determined prior to final design to evaluate on-line and stand-by power requirements of the TCC.

- b. Foundation, footing, and site recommendations were based on the information available in referenced document, Paragraph 3.2.1 b.

- c. Manufacturers' specific instrumentation requirements for technical collateral equipment are not included in these criteria since vendors have not been selected.
- d. Siting criteria assumptions, reference Paragraph 4.2.1.1.
- e. The technical collateral equipment used for facilities design is representative and typical of types and sizes of equipment rather than final, since the weapon system is presently in the R&D stage and final selection of TCE has not been made. (Technological advances in technical collateral equipment may increase or decrease facility requirements).

2.3 STATUS OF UNRESOLVED DATA

To insure engineering adequacy of the preliminary drawings and specifications prepared from these criteria, the architect-engineer executing the final design will be responsible for the necessary coordination with the design agency to clarify the design limitations above.

SECTION 3
DESIGN CONTROLS

3.1 GENERAL DESIGN CONTROLS

Designs should comply with the latest issues of standard and military codes and specifications, except where specific recommendations are contained herein.

3.2 SPECIAL DESIGN CONTROLS

The following special design controls were used for reference in developing these criteria.

3.2.1 Published Data.

- a. "MIDAS Tracking and Control Center Facilities Criteria, Part I, Equipment and Operation Concepts", January 6, 1961, (Secret), LMSD-447741.
- b. "Basis for Design and Outline Specifications for Tracking and Data Acquisition Station", (Central U.S.A.), June 1959, prepared by Kirkham, Michael and Associates; Contract No. AF 04(647)-356, for the Department of the Air Force, ARDC, AFBMD.
- c. "Design Criteria and Outline Specifications, Development/Operational Tracking Station", (Central U.S.A.), October 13, 1958, (Secret), LMSD-84552, prepared by The Ralph M. Parsons Company.
- d. "Site Selection Study, WS-117L Development/Operational Tracking Station, Central Sites", July 22, 1958, (Secret), LMSD-84549, prepared by The Ralph M. Parsons Company.

3.2.2 Specific Criteria Data. Drawings prepared by Kirkham, Michael and Associates for the Department of the Air Force, Air Force Ballistic Missile Division (ARDC), "Tracking and Data Acquisition Station", (Central U.S.A.), used for siting this facility are listed below.

<u>Drawing No.</u>	<u>Sheet</u>	<u>Title</u>
a. AW00-00-00	G-2	General Legend
b. AW71-08-01	C-1	Site Plan - Gas, Water and Sanitary Sewer Distribution Systems
c. AW16-14-01	C-2	Receiving Area I, Soil Boring Logs
d. AW16-14-01	C-3	Receiving Area II, Transmitting Area, Soil Boring Logs
e. AW16-01-01	C-4	Receiving Area I, Horizontal Control Plan
f. AW16-01-01	C-5	Receiving Area I, Parking Area, Horizontal Control and Painting
g. AW16-01-01	C-6	Receiving Area II, Horizontal Control Plan
h. AW16-01-01	C-7	Transmitting Area, Horizontal Control Plan, Grading and Drainage
i. AW16-01-01	C-8	Receiving Area I, Grading and Drainage
j. AW16-01-01	C-9	Receiving Area II, Grading and Drainage
k. AW16-01-01	C-10	Grading Sections and Paving and Grading Details
l. AW16-01-01	C-11	Grading Sections
m. AW71-08-01	C-12	Receiving Area I, Utilities Plan
n. AW71-08-01	C-13	Receiving Area II, Utilities Plan
o. AW71-08-01	C-14	Transmitting Area, Utilities Plan
p. AW71-07-02	C-15	Sanitary Sewer System Sta. 0 + 00 to Sta. 33 + 00
q. AW71-07-02	C-16	Sanitary Sewer System Sta. 33 + 00 to Sta. 61 + 45
r. AW35-19-01	M-17	Typical Details, Flow and Control Diagram

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	<u>Drawing No.</u>	<u>Sheet</u>	<u>Title</u>
s.	AW35-19-01	M-18	Typical Details, Flow and Control Diagram
t.	AW35-19-01	E-1	Power System Single-Line and Instrumentation Duct Block Diagram

C

SECTION 4

ARCHITECTURAL AND ENGINEERING ANALYSIS

4.1 GENERAL

This Basis for Design is the result of initial investigations which were concentrated upon the functional and operational aspects of the Tracking and Control Center, and subsequent investigations which were related to the engineering and technical problems peculiar to the weapon system requirements.

The material to follow represents a carefully considered solution to meet these requirements. It represents an optimum criteria design based upon a balance between the requirements of the operating personnel and the problems associated with the practical realization of these designs.

The plan is based on information available for the proposed technical collateral equipment (TCE) for this weapon system. The TCE used in the preparation of this Basis for Design was taken as representative and typical of the kinds of equipment which could accomplish the required task since final selection of TCE has not been made. The basic criteria for facilities design included flexibility, additional air-conditioning and electrical capacity, and generalization of equipment sizes and locations. This demanded buildings capable of modification with a minimum amount of disruption to operating groups.

Selection of recommended materials, methods of construction, and facility equipment was based on common practice and is in conformance with recognized

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codes, standards, specifications, and the parameters established in Part I of these criteria. After careful evaluation, the most economical system based on the technical requirements is herein presented for the construction of these facilities.

4.2 CIVIL

4.2.1 Facilities Siting. The site selected is located in Central U.S.A. within the confines of a former military base, which will enable the use of existing base support structures for the support of this facility.

4.2.1.1 General. The proper performance of the Tracking and Control Center depends upon the transmission and reception of undistorted RF signals over an ample period of time and within tolerable signal degradation limits. These factors vitally affect the siting layout and the relationship and orientation of the TCC components to one another and to the surrounding areas. It was assumed in siting the facilities that:

- a. The existing power line immediately north of the site would be placed underground if required.
- b. The existing utilities are adequate, or would be modified if required to accommodate the new facilities.
- c. Existing airport traffic would be curtailed if required to prevent operational interference; (the antennas shown on Drawing 1868-1/101 (in Part I of these criteria) do not interfere with the present air traffic patterns).
- d. The existing road immediately north of the site would be closed if required due to operational interference.
- e. The property immediately north and west of the site would be zone controlled to prevent possible interference from future construction.

4.2.1.2 Topographic Considerations. The recommended site is located on relatively flat terrain which is acceptably free from electromagnetic disturbances, reference "Site Selection Study, WS-117L Development/Operational Tracking Station, Central Sites", LMSD-84549. The topographical

features of the site permit favorable reception of low-limit, line-of-sight signals from a great distance.

4.2.1.3 Scanning Capabilities. The Antenna Support Structures, Radome Support Structures, the Satellite Communications Buildings and the Central Operations and System Control Building are located to conform to the "Factors Affecting Site Layout", established in Part I of these criteria.

All areas on the former military site which would not interfere with present air traffic were investigated as possible sites for the MIDAS TCC. One site south of the south landing mat limited the site expansion capabilities necessary for this program beyond the current planned facilities, and in addition was adjacent to a heavily traveled off-base road. Another site north of the existing dispensary had sufficient area for the presently planned and possible future expansion requirements. However, the siting of the TCC complex in this area required the demolition or deactivation of all existing facilities within and near this area.

This analysis and evaluation resulted in selection of the site as shown on Drawing 1868-1/101 (in Part I of these criteria) as the most desirable for this program.

The recommended location provides the least obstruction to the continued use of the base support facilities and airfield, and in addition provides the capability of adding structures within the existing developed portion of the base, should this be required in the future.

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It is recommended that the three antennas and adjoining Satellite Communications Buildings be located to form an equilateral triangle with a distance of 1,000 feet between centerlines of antennas. The COSCB can then be located midway between two of the antennas as shown on the Site Plan. The proposed location will permit additional construction to the east of the COSCB without antenna interference and reduces the cable runs from the equipment in each SCB to the related equipment in the Data Analysis Area within the COSCB. With this distance between antennas, the difference in elevation between antenna pedestals cannot be greater than 2 feet to meet the scanning requirements established in Part I of these criteria. Since the terrain is relatively flat, the location of the facilities as sited entails a minimum of earthwork.

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In addition, the recommended location provides for a minimum of roadwork, ready access to the COSCB from the main area of the existing base facilities, and eliminates unnecessary traffic in the vicinity of the antennas. If, in final design, access is from the north to permit continued operation of the airport, the TCC complex layout can be rotated counterclockwise to bring the access road directly to the front of the COSCB.

4.3 ARCHITECTURAL AND STRUCTURAL

The design of the buildings and structures as proposed on the drawings was based on analysis of the functional requirements of the technical collateral equipment to be housed in the buildings, and the weapon system personnel and facility functional and operational requirements as described in Part I of these criteria.

4.3.1 Central Operations and System Control Building (COSCB). The following describes the Central Operations and System Control Building, the building analysis, functional evaluation, materials of construction and design considerations.

4.3.1.1 Building Description. The COSCB is a one-story windowless, rectangular structure having an approximate total gross floor area of 112,750 square feet, which includes approximately 100,200 square feet on the main floor, 3,200 square feet on the mezzanine, and 9,350 square feet in the roof fan houses. Room sizes and arrangements have been based upon the functional requirements of the subsystems and are consistent with maximum utilization of available floor space.

4.3.1.2 Building Analysis. The building basically consists of four functional areas: technical, technical support, administration, general support,

The functions and interrelationships, and the nature of equipment associated with each subsystem, are described in detail in Part I of these criteria.

The design of the COSCB considered the individual requirements of each primary operating subsystem, along with the requirements imposed by integration of these subsystems and the related technical support, administration, and general support functions into an effective system.

A comparative analysis was made of various design approaches. These included one-floor, two-floor, three-floor and one-floor-with-basement schemes.

- a. Three-Floor Schemes. The three-floor schemes developed lacked the flexibility required of a building which must house a weapon system with peculiar functional requirements. For this weapon system the basic subsystems do not lend themselves to fairly equal areas; therefore, in the three-floor schemes this presented additional space which could not be justified. In addition, cable runs between equipment became complicated, limited distance cable runs became excessive, and work flow between interrelated subsystems became cumbersome. In general, the building was uneconomical when compared to the one-floor schemes.
- b. Two-Floor Schemes. Compared to the one-floor schemes, the two-floor layouts required approximately 10 per cent more building area and were proportionately 10 per cent more costly; the cable runs between equipment were excessive and less economical; the facility mechanical equipment was more complicated; a freight elevator was required for handling of TCE; and the physical traffic flow was less efficient, requiring personnel to travel from floor to floor in the course of normal operations. In general, the interrelated locations of the subsystems did not fulfill the functional requirements of the weapon system as well as in the one-story scheme.
- c. One-Floor-With-Basement Scheme. The one-floor-with-basement scheme was developed to investigate the possibility of providing basement space for housing mechanical and electrical equipment, facilities for nontechnical storage, and a ready access to cables extending between TCE to facilitate handling during relocation or substitution of equipment in the technical rooms on the main floor.

Upon evaluation, it was found that the other functions intended to be located in the basement interfered with the freedom of cable movement; the method of penetrating the floor above became complicated and lacked the essential flexibility required; additional perimeter retaining walls and interior columns and beams were required to support the main floor; and in conformance with the National Building Code, firewalls were required in the basement and main-floor areas. Under these conditions the additional cost required to provide the basement was felt to be unjustified.

d. One-Floor Scheme. The one-floor scheme shown on the drawings is recommended based on the following:

- (1) The interrelated primary operating functions are in proximity to one another to fulfill the weapon system basic requirements.
- (2) In general, cable lengths between TCE are kept to a minimum and fulfill limited cable run restrictions where required.
- (3) Physical traffic flow distances between related technical functions are kept to a minimum.
- (4) Over-all control and technical and nontechnical administration functions are strategically located with relation to the weapon system prime functions.
- (5) The over-all building area is kept to a minimum, yet provides the flexibility and expansion capability required for this type facility.
- (6) The spacing of structural columns allows the required flexibility for rearrangement and relocation of room partitions or TCE.
- (7) The depressed floor slab, with removable floor access panels, provides ready access to cabling for replacement or rearrangement of TCE.
- (8) The building is classified as Type "N" (noncombustible), Classification 3 (unprotected, noncombustible) construction as defined in AFM 88-15. In accordance with the National Building Code, Section 402.3 (g), fire-wall separations are not required since the building complies with the following:

- (a) It is outside the fire limits.
- (b) It is one story high, without basement.
- (c) Stocks of noncombustible material within the building are not crated in combustible material.
- (d) A horizontal separation of 80 feet is provided around all sides of the building.
- (e) Means of egress are provided in accordance with the code.

4.3.1.3 Structural Analysis. The COSCB is located in a minimum seismic zone. The building is one story high and wind is the controlling factor; therefore, lateral loads are nominal. It is recommended that the lateral load resisting elements be limited to the outside walls and to the walls which bound the mezzanine portion. This arrangement enhances the desired flexibility for relocation of interior partitions.

To provide relatively column-free areas for all technical rooms, and flexibility for presently planned or future interior partition locations, it is recommended that this building utilize a 42-foot-6-inch by 60-foot-0-inch framing bay system consisting of 42-foot-6-inch trusses at 20-foot intervals, supported on trusses spanning 60 feet, with short-span steel decking on steel joists which span 20 feet. This recommendation is based on comparative economic studies of various framing schemes, and the weapon system requirement for facility flexibility.

Framing schemes considered included various combinations of long or short-span steel decking, long or short-span steel joists, beams, trusses or

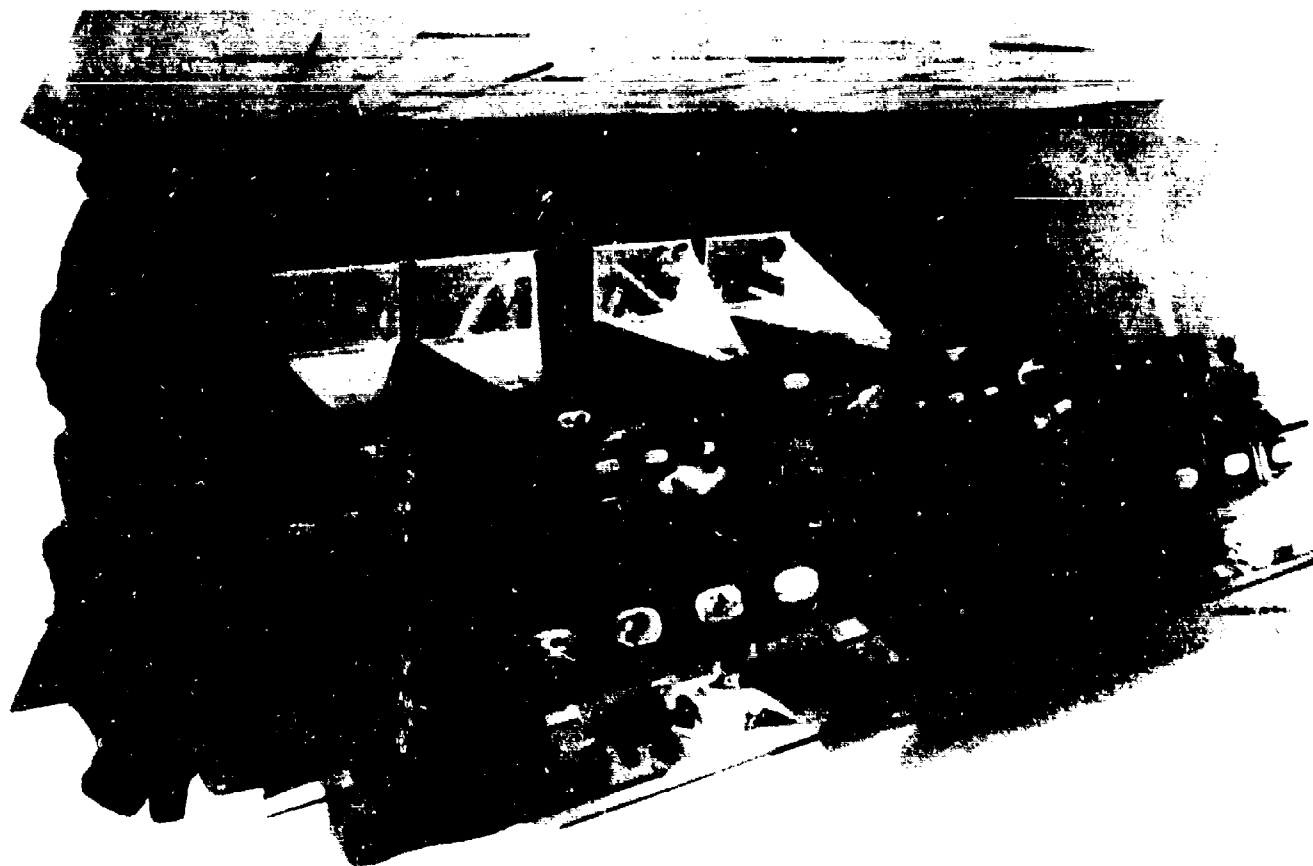
tapered steel girders, and 20-foot by 40-foot or 42-foot-6-inch by 60-foot framing bays.

The 20-foot by 40-foot framing bay systems (approximately 24 cents per square foot more economical) were rejected since they lacked the degree of flexibility required for this weapon system.

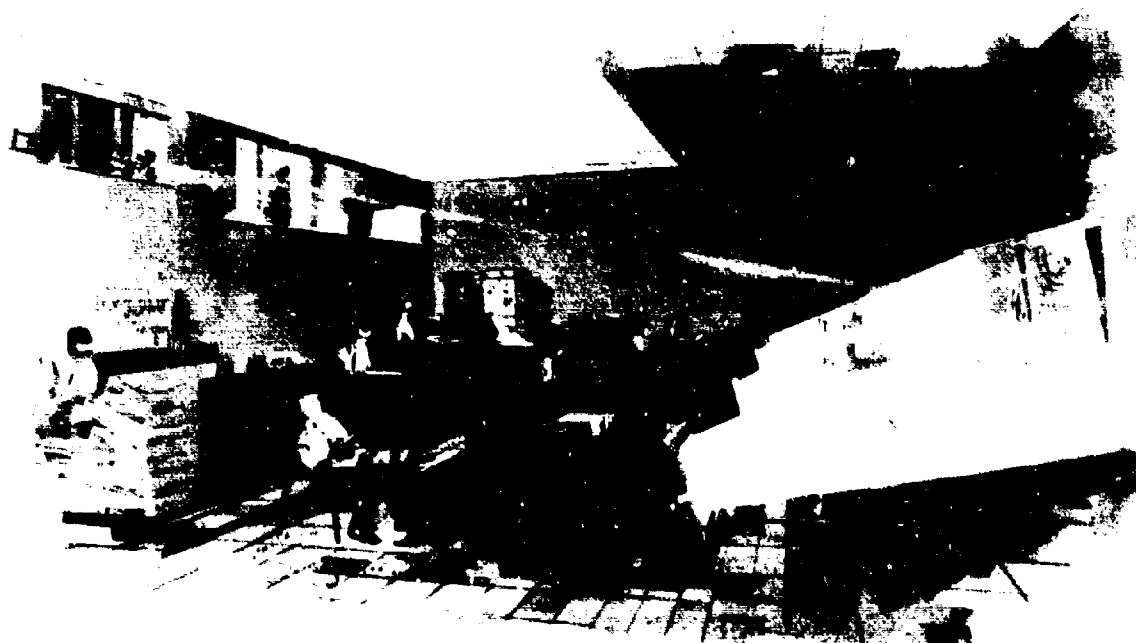
Of the 42-foot-6-inch by 60-foot bay schemes investigated, two provided the required flexibility and column-free floor areas, and were favorable in cost. These systems were similar in framing, except that one utilized trusses and the other tapered steel girders; the trusses offered an advantage in the method of ceiling support.

4.3.1.4 Functional Evaluation. The proximity of one subsystem to another, as shown on the drawings, is in direct proportion to the frequency of interrelated operations. These functional interrelationships and the analyses which determined the relative locations of the various subsystems and functional areas within the building are as follows:

- a. Data Processing and Analysis. This subsystem acts as the hub for the other operating subsystems of the TCC. It serves as the storage and switching unit between the various input devices, and performs all of the automatic arithmetic computations for the Station's dispersed SCB's and the operating subsystems within the COSCB. The physical location of this subsystem is midway along the west exterior wall of the building to facilitate instrumentation and communication cabling between the SCB's and the COSCB. The related primary operating subsystems are located adjacent to this subsystem to the east and north.
- b. Central Control. The flow of data between this subsystem and the other primary operating subsystems, the short cable-run requirements to the Data Analysis function, and the



CONTROL ROOM
TRACKING AND CONTROL CENTER



quantity of data transmitted between this subsystem and the Communications subsystem, determined that Central Control should be located adjacent to, or adjoining if possible, these closely functioning subsystems.

Central Control operational requirements, which include facilities for observation and projection (projector height of approximately 16 feet), established a minimum 20-foot ceiling height in the Central Control Room. The use of a mezzanine level for the Projection Room and the Observation Room, both located over the Equipment Room, is recommended to meet these requirements. It is further recommended that the areas over the Operations Planning Room, Projection Booth, Equipment Room Office, and Maintenance and Storage Room, be extended to mezzanine roof height to provide the expansion capability for Central Control as shown on the drawings.

Initial construction should provide the capability for Central Control to expand the entire width of the 20-foot-high area, from corridor to corridor, without major structural changes or interruption to operations. If this expansion occurs, the Operations Planning Room, Projection Room, and the Equipment Room will require additional space. Either a new area located over the Data Processing and Analysis Room will be required, or one of the nontechnical areas presently located adjacent to Central Control will be displaced. This displaced area will then be moved to a new building location or to an addition to the building.

- c. Communications. This subsystem handles all of the inter- and intra-station communications requirements for the primary operating subsystems and administration functions of the TCC. Its location, adjacent to both Central Control and the administration area, was selected based on the major flow of data between this subsystem and the Central Control subsystem, the Data Analysis subsystem, and the administration area. To provide ready access to the two communications lines classified "secret", these lines should be placed in the attic space over the corridors, and the corridor ceilings provided with removable panels. An alternate method would be to provide catwalks and lights in the attic area.
- d. Tracking Control. The location of the Tracking Control subsystem was dictated by the requirement for relative isolation with respect to the other primary operating subsystems, and by the flow of data from Data Analysis, and to Central Control and the three remote SCB's. This subsystem was located across the corridor north of Data Analysis.

- e. Weather Analysis. The weather analysis function continuously monitors Northern Hemisphere weather conditions. Data received from Communications is integrated, analyzed, and evaluated in this functional area, then transmitted to Data Analysis. Based on data flow, this function was located across the corridor north of Data Analysis.
- f. Technical Support Functions. The technical support functions, including Central Maintenance, Maintenance Test, Maintenance Analysis, Reliability, Calibration Laboratory, Standards Laboratory, Quality Assurance Receiving Inspection, Shipping and Receiving, Material Review Board, Supply Administration, and Storage, which are primarily technician-type functions, were grouped in a technical support area located across the corridor south of the technical area. This location provided the using subsystems with ready access to the support functions.

The individual support functions within this area were arranged to provide continuity of work and traffic flow. In addition, maintenance and storage facilities were provided in each primary operating subsystem to perform these functions at the organizational level.

Functions such as Tracking Control Staff Engineers, Tracking Operations Technical Representatives and Technical Operations Drawing Maintenance Staff were located north of the technical area and between the technical area and the administration area, to act as a buffer zone between these two dissimilar functions. These technical support groups are functionally related to both the technical and administration functions.

The Storage Room and the Controlled Storage Area are for technical collateral equipment and technical components only. It is recommended that storage and warehousing facilities be provided in one of the existing on-site buildings for house-keeping supplies.

- g. Administration. Administration and technical management functions were primarily located in a U-shaped area north of the technical area, along the building's north exterior wall, as shown on the drawings. These included the Station Manager, Assistant Station Manager, Administrative Staff, Engineering Staff, Subsystem Directors and Managers, Document Control, Publications and Reproduction, Mail Service, Personnel and Industrial Relations and Stenographic Services. This over-all area was divorced from the technical area based on the dissimilarity of function, and to reduce unnecessary administration personnel traffic in the technical areas. The

inherent differences in required working conditions, i.e., type of lighting, air-conditioning requirements, fire-protection requirements, et cetera, lent themselves to a physical separation.

Individual technical management functions were located within the subsystems in the technical areas only where required.

It is recommended that a cabinet for flammable materials be provided for storage in the reproduction area of the Publications and Reproduction Room.

- h. Facility Support. Facility support functions, including security, first aid, dining, and building maintenance, were located in areas most compatible to their function.

The dining facilities were located in the southeast corner of the building, fairly well isolated from the primary operating subsystems. These facilities are recommended due to the relative isolation of the proposed TCC to other facilities, the expected number of prime shift and remaining shifts personnel and visitors, the multishift and split-shift nature of the over-all TCC operation, and the "relief break" operational requirement of certain subsystems.

It is anticipated that the TCC will attract Government dignitaries; therefore, a Dining Area and Dining Alcove are recommended for serving these "VIP's" in an area independent of, but in proximity to the Cafeteria. These areas can, in addition, provide a day-room area for operating personnel during relief break or "off time" stand-by during nonscheduled meal times.

Alcoves for vending machines have been provided in two locations for immediate access during break periods.

The Equipment Field Maintenance Support function and Maintenance Services Supply function should be located in an existing on-site building.

- 4.3.1.4 Building Materials. The following describes the building materials to be used for construction:

- a. Footings. The footings and foundation walls should be reinforced concrete.
- b. Dampproofing, Waterproofing, and Sealing. Dampproofing should be provided under concrete floor slabs. Waterproofing should be provided on exterior walls around depressed areas. Sealing of the exposed concrete below the removable floor is recommended to prevent dusting and residual chemical action affecting equipment or cabling. Provision should be made in final design to insure that the depressed slab and underfloor pit areas remain dry at all times to prevent damage to cabling and TCE. All utility lines and instrumentation and communication duct banks should slope away from the building.
- c. Floors. All floor slabs and depressed slabs should be concrete with smooth trowel finish.
 - (1) All areas housing technical collateral equipment should have free-access floor panels above depressed concrete slabs, as noted under "Special Conditions" below, except the Communications Equipment Room, Crypto Room, Switchboard Room, and Supply Communications Office.
 - (2) All floor finishes should be asphalt tile or vinyl asbestos tile, with rubber base, except as noted below.
 - (a) Toilet room floors and base should be ceramic tile.
 - (b) The Kitchen and Cafeteria Serving Area floor and base should be quarry tile.
 - (c) Floors should be exposed concrete in the mechanical and electrical equipment rooms, Shipping and Receiving Room, Storage Area, and Boiler Room.
 - (d) The floor finish in the Dark Room should be chemical-resistant asphalt tile.
- d. Exterior Walls. Reinforced concrete tilt-up panels are recommended based on an economic analysis and evaluation of various construction materials capable of providing the required "U" values.
- e. Roof. Roof construction should be built-up roofing over insulation and vapor seal, over metal decking on structural steel framing.

- f. Parapet Walls. Minimum height parapet walls should be provided.
- g. Flashing. Flashing, where required, should be ferrous metal.
- h. Expansion Joints. Expansion joints, if required, should be protected with 16-ounce copper and premolded filler expansion-joint material, covered with elastic cement or caulking.
- i. Interior Walls. Interior walls should be non-load-bearing concrete block.
- j. Interior Partitions. Interior partitions should be dry-wall or plaster on studs, except as noted below under "Special Conditions".
- k. Ceilings. Ceilings should be suspended, removable, acoustic modular panels, except as recommended for the areas or rooms indicated below.
 - (1) Suspended plaster ceilings should be provided in the toilet rooms, janitors' closets, support supply rooms, and Kitchen.
 - (2) Suspended acoustic plaster ceilings should be provided in the Lobby, Cafeteria, VIP Dining Area and VIP Dining Alcove.
 - (3) Exposed roof construction should be provided in the electrical equipment rooms, Shipping and Receiving Room, Storage Room, Boiler Room, Refrigeration and Fan Room, and the roof fan houses.
- l. Doors. Doors should be flush wood except as noted below.
 - (1) Doors in areas which require acoustical treatment should be solid core flush wood, and weatherstripped.
 - (2) Doors to areas housing technical collateral equipment should be solid core, flush wood, pair doors 6 feet 0 inches wide by 8 feet 0 inches high, weatherstripped where required.
 - (3) Doors to mechanical and electrical equipment rooms should be hollow metal.
 - (4) Vault and Crypto Room doors should be standard fire-rated vault doors (Underwriters approved), of standard manufacture for the design purpose.

- m. Hardware. Hardware should be of standard manufacture for the design purpose.
 - (1) Limited access rooms must be provided with panic hardware (without exterior hardware) on exit doors only.
 - (2) Doors requiring security control should have panic hardware, wire and lead seals, and should have no exterior hardware.
- n. Painting. All interior and exterior surfaces, except acoustic panels, should be painted.
- o. Roof Fan Houses.
 - (1) Floors. Floors should be reinforced concrete slab with 6-inch concrete perimeter curbs with integral waterproof membrane. All pipes, ducts, and conduits penetrating the floor should be sleeved and thoroughly flashed and caulked to prevent water and moisture from penetrating to the ceiling area below.
 - (2) Exterior Walls. The exterior walls should be steel frame with structural insulating panels.
 - (3) Roof. The roof should be built-up roofing over rigid insulation on an impervious membrane over steel decking, on steel framing.
 - (4) Doors. Doors should be hollow metal, set in pressed metal frames.
- p. Special Conditions
 - (1) Walls and ceilings in the following rooms should be given special acoustic finish above 4-foot-0-inch hardboard wainscots: Message Center Room, Crypto Room, Projection Room, Operations Planning Room, Data Processing and Analysis Room, Tracking Control Room, Projection Booth, Observation Room.
 - (2) Staggered stud partitions with acoustic blankets should be provided around the following rooms: Central Control Room, Message Center Room, Scullery.
 - (3) The interior face of electrical equipment rooms and Refrigeration and Fan Room concrete block walls, common to office and technical rooms, should be acoustically treated.

- (4) Lighting and utility connections in the Data Processing and Analysis Room and Central Control Room should be arranged to eliminate interference with the partitions indicated on the drawings by dash lines.
- (5) Rooms with technical equipment must be provided with free-access, removable floor panels, covered with sheet vinyl; (cork is recommended for the Central Control Room to attenuate sound). Laminated or cast-metal floor panels, keyed to fit independent supporting posts spaced to conform with the panel size, are recommended. Panels should conform to a 1-foot-6-inch or 2-foot-0-inch square module to allow panel omission where racks occur. Individual panel units must be removable without disturbing adjacent units. The finish floor should be level to within 1/8 inch in any direction within a horizontal distance of 20 feet 0 inches. A minimum dimension of 18 inches is recommended between subfloor and top of finished floor panels, except in the Mezzanine Projection Room and Observation Room, where the recommended dimension is approximately 8 inches. A minimum space of 16 inches should be provided between subfloor and panel floor members to accommodate cabling and ductwork, except in the Mezzanine Projection Room and Observation Room where 6-inch-clear space should be provided. Panels must be devoid of metal edging or other exposed metal protrusions, and must be constructed and installed so as to be dusttight (to prevent entry of dirt into the underfloor space).
- (6) The floor support system of the technical corridors over depressed slabs should be of similar construction to the support system of the free-access removable floors to provide space for cabling and ductwork under the corridors between technical areas. The floor should be of permanent construction of material similar to free-access panels. Dimension from depressed slab to finish floor, and the minimum space between depressed slab and underside of floor should be the same as for adjacent free-access floor areas.
- (7) Based on present-day freight-handling operations, where truck tailgates are hydraulically operated, and to avoid drainage and freezing problems inherent with an exterior depressed ramp, it is recommended that the loading dock in the shipping and receiving area be at grade.

4.3.1.5 Design Considerations.

- a. Wind. National Bureau of Standards should be used for wind-load requirements.
- b. Live Loads.
 - (1) Roof. 40-pound-per-square-foot snow load
 - (2) Floor
 - (a) All areas should be capable of sustaining a uniform load of 100 pounds per square foot and a concentrated load of 1,000 pounds, except as noted below.
 - (b) In accordance with the manufacturer's recommendations, the free-access removable floor panel areas should be capable of sustaining a uniform load of 250 pounds per square foot and a concentrated caster load of 1,000 pounds, with a maximum allowable deflection of 1/16 inch.
- c. Special Consideration. Special consideration should be given to the structural design of the Projection Room and Observation Room floors. Foot traffic should not cause deflection or vibration of images projected on the screen in the Central Control Room. It is recommended that these floors utilize a concrete slab supported by steel framing, with an allowable maximum deflection under live load limited to 1/360 times the span.
- d. Equipment Foundations and Supports. Each item should be designed for the specific loads. Centrifugal equipment foundations should have a minimum ratio of foundation to equipment weight of 3 to 1. Reciprocating equipment foundations should have a minimum ratio of foundation to equipment weight of 5 to 1.
- e. Foundations. A foundation investigation and recommendation report will be required prior to final design to establish the allowable soil pressure and design capabilities for foundation design. Building footings should extend below the frost line.
- f. Frost Line. The frost-line depth is 48 inches.
- g. Seismic. The site is Seismic Zone 0 in accordance with the Uniform Building Code.

4.3.2 Satellite Communications Building (SCB). The following describes the Satellite Communications Buildings, the building analysis and the materials of construction. The buildings are Type "N" (noncombustible), Classification 3 (unprotected noncombustible), as defined in Chapter B and Appendix C of AFM 88-15.

4.3.2.1 Building Description and Analysis. Three identical one-story rectangular, windowless structures, each having a total gross floor area of approximately 3,150 square feet, are required.

An analysis was made of designs previously developed for VHF Receiver and UHF Receiver Buildings prepared for the SANOS and MIDAS programs, and the SCB's prepared for the U.K. MIDAS Station.

After evaluation, it was determined that the SCB's design for the U.K. MIDAS Station most closely met the technical and physical traffic requirements for this station, and was therefore used as a basis for the design of these SCB's.

Each SCB is connected to a Radome Support Structure (which encircles the Antenna Support Structure) by an enclosed passageway. Location of the SCB's with respect to the Radome Support Structures is based upon a maximum cable run distance of 200 feet from the antenna horn to specific communications equipment in the Receiver-Command Room. The SCB's are separated from the Radome Support Structures by approximately 17 feet to provide an RF radiation buffer zone for operating personnel. The passageway

provides a personnel entrance to the Radome Support Structure required for frequent operator trips to the antenna. To prevent sudden changes in temperature and dust and moisture from entering into the Receiver-Command Room, access should be provided through a vestibule or passageway with double sets of doors.

Room sizes and building arrangements are based upon maximum floor space utilization consistent with equipment and personnel requirements and work flow, and include the requirements for "technical equipment to be defined". Modular free-access removable floor panels over depressed concrete slabs are required for cable runs between TCE in the Receiver-Command Rooms and the Console Rooms to provide the flexibility and expansion capability described in Part I of these criteria; cable trenches with removable trench covers are provided from the Receiver-Command Rooms to the Cable Rooms of the Antenna Support Structures. Each building includes the following.

- a. Console Room. This room houses the Master Transmitting and Receiving Control Console and is separated from the Receiver-Command Room by a partition with viewing windows to reduce sound transmission to the Control Room. It is located adjoining the Receiver-Command Room for control and visual observation of transmitting and receiving operations.
- b. Receiver-Command Room. This room houses the equipment for the transmission and reception of satellite RF signal data. Its location is limited by the cable length distance from specific equipment to the antenna horn, as specified in Paragraph 4.3.2.1.
- c. Equipment Room. This room, which houses the mechanical and electrical equipment needed to service the technical collateral equipment and building requirements, is located adjacent to the Receiver-Command Room to reduce conduit and duct runs.

- d. The remaining rooms are located on either side of the entrance corridor, in proximity to the technical rooms.

4.3.2.2 Building Materials. The materials to be used for construction are described in Paragraph 4.3.1.4, except as noted below.

- a. Floors. The floor in the Receiver-Command Room and the Console Room should be a modular, free-access floor as described in Paragraph 4.3.1.4 p.(5).
- b. Exterior Walls. Exterior walls should be load bearing, reinforced concrete block.
- c. Interior Walls. Interior walls should be load bearing reinforced concrete block.
- d. Ceilings. The Maintenance Shop and the Technical Storage Room should be suspended dry-wall.
- e. Doors. Pair of doors indicated on the drawings should be 6 feet 0 inches wide by 8 feet 0 inches high to accommodate equipment passage; all other doors should be of standard manufacture for the design purpose.
- f. Special Conditions. Perimeter walls in the Receiver-Command Room and the Console Room should be vapor sealed and insulated with approximately 3-1/2 inches of insulation blanket. The wall finish in these rooms should be acoustic tile from the 4-foot-0-inch-high hardboard wainscot to the ceilings.

4.3.3 Antenna Support Structure. The following describes the Antenna Support Structure, the design analysis, design considerations, and materials of construction. This structure is Type "N" (noncombustible), Classification 1 (fire resistive), as defined in Chapter B and Appendix C of AFM 88-15.

4.3.3.1 Structure Description and Analysis. Three similar Antenna Support Structures are required. The 20-foot-high Antenna Support Structures are square, reinforced concrete, and are designed to support the 60-foot

parabolic RF receiving and transmitting antennas. The Antenna Support Structures and antennas are enclosed within the radome and Radome Support Structures. The structures include cable rooms and cantilevered top platforms (decks) with concrete antenna base-mounting curbs and pipe guardrailings. Exterior stairs should be provided for access from the radome structure floor to the platforms. Cable trenches should be provided as described in Paragraph 4.3.2.1, between the cable rooms and the depressed slabs in the SCB's.

The distance from the center of the Antenna Support Structures to the face of the SCB's should be approximately 55 feet, to provide a radiation buffer zone separation and minimum cable run distances as described in Paragraph 4.3.2.1.

4.3.3.2 Design Considerations. The following Antenna Support Structure design criteria are based on the best information available, as the antenna currently is in the design stage. In computing wind loads, 90-knot winds have been assumed as maximum.

a. Antenna Design Loads and Dimensions.

Maximum Antenna Total Gross Weight (Including Pedestal) - 300,000 pounds.

Minimum Antenna Total Gross Weight (Including Pedestal) - 90,000 pounds.

Heaviest Component - 18,000 pounds.

Live Load on Platform - 250 pounds per square foot.

Antenna Mounting Height (Base of Pedestal to Center of Reflector) - 40 feet 0 inches.

Antenna Reflector Diameter - 60 feet 0 inches.

Maximum Overturning Moment Due to Accelerating and Decelerating
Inertia of Antenna Reflector - 23,000 ft. lbs.

(Although it is expected that the antenna will be covered by a protective radome, it is probable that it may be operational prior to installation of the radome, and there may be periods when the radome will be removed, exposing the antenna to the elements. For this reason the additional criteria in Paragraphs b. and c. below are shown).

b. Wind Loads Due to 50-Knot-Wind, Antenna Operational,* (With Reflector Sighting Axis Horizontal)

Horizontal Drag - 35,000 pounds.

Vertical Uplift on Reflector - 10,000 pounds.

Overturning Moment - 1,600,000 ft. lbs.

Maximum Torsion Due to Wind About Vertical Axis of the
Antenna Pedestal - 132,000 ft. lbs.

c. Wind Loads Due to 90-Knot Wind, Antenna Stowed,* (With Reflector Sighting Axis Vertical)

Horizontal Drag - 61,000 pounds.

Vertical Uplift on Reflector - 57,000 pounds.

Overturning Moment - 2,700,000 ft. lbs.

d. Antenna Base Mounting Details. Rigidity requirements are as follows:

- (1) Maximum allowable temporary rotation of the top of the support structure due to the effects of a 50-knot wind when antenna is operational (antennas will be stowed in winds above 50 knots) - 0.15 milliradian.

*Wind overturning moments are taken about the centerline of the antenna pedestal base. They include the effects of both horizontal and vertical wind-force components. The wind angle of attack, assumed at 15 degrees upward from the horizontal, yields load values larger than loads produced by a horizontal wind. The assumed wind velocities are based on maximum gust velocity.

- (2) The structure should not permanently deflect, settle or rotate under the effects of a 90-knot wind with antenna stowed.
- (3) To insure against excessive long-term settlements of the structure foundations, the bearing soil strata should be capable of supporting a load equal to twice the design load for a period of at least 48 hours without settlement.
- (4) Settlement should not cause the center of the radome to be displaced from the center of the antenna by more than 6 inches.

4.3.3.3 Building Materials. The following describes the materials to be used for construction.

- a. Structure. The entire structure should be constructed of reinforced concrete.
- b. Access Stair. The access stair should be steel frame with safety treads and steel pipe handrails.
- c. Guardrailings. Steel pipe guardrailings should be used around the perimeter of the platform.
- d. Antenna Anchors. Steel bolts and plates should be used to anchor the antenna to the Antenna Support Structure curb as indicated on Drawing 1868-1/112. The sizes and locations of bolts and plates should be verified prior to final design.

4.3.4 Radome Support Structure. The following describes the Radome Support Structure, the design analysis, design considerations, and materials of construction. This structure is Type "N" (noncombustible), Classification 1 (fire resistive), as defined in Chapter B and Appendix C of AFM 88-15.

4.3.4.1 Structure Description and Analysis. Three similar Radome Support Structures are required. The Radome Support Structures are cylindrical, reinforced concrete structures which surround the Antenna Support Structures,

and support the protective radomes. A 16-foot-0-inch-wide by 13-foot-0-inch-high exterior service entrance with rolling door and concrete ramp should be provided for service entrance in each structure. The location of the service door as indicated on the drawings is optional and may be relocated in final design to accommodate roadway layout. The rolling door should be provided with a heating element to prevent freeze-up in winter weather. The Radome Support Structures are connected to the SCB Receiver-Command Rooms by enclosed passageways as described in Paragraph 4.3.2.1.

4.3.4.2 Design Considerations. Each Radome Support Structure must carry the dead weight of the radome plus loads due to wind. These loads are delivered to the structure as membrane stresses acting in the plane of the radome surface. Vertical components must be carried in compression by the structure walls to the foundations. Horizontal components must be carried by the top portion of the structure acting as a structural ring. The structural ring must resolve the horizontal components into shear loads that are carried in shear by the structure wall to the foundation.

Design loads based on a 90-knot wind are shown below. The 90-knot wind has been assumed as maximum (see Figures 4-1, 4-2, and 4-3).

Radome Total Dead Weight	198,500 pounds
Lift	149,650 pounds
Drag	136,000 pounds
Moment	5,986,000 ft. lbs.
Equatorial Diameter	110 ft. 0 in.
Minimum Equipment Access Door Size	13 ft. 0 in. high by 16 ft. 0 in. wide

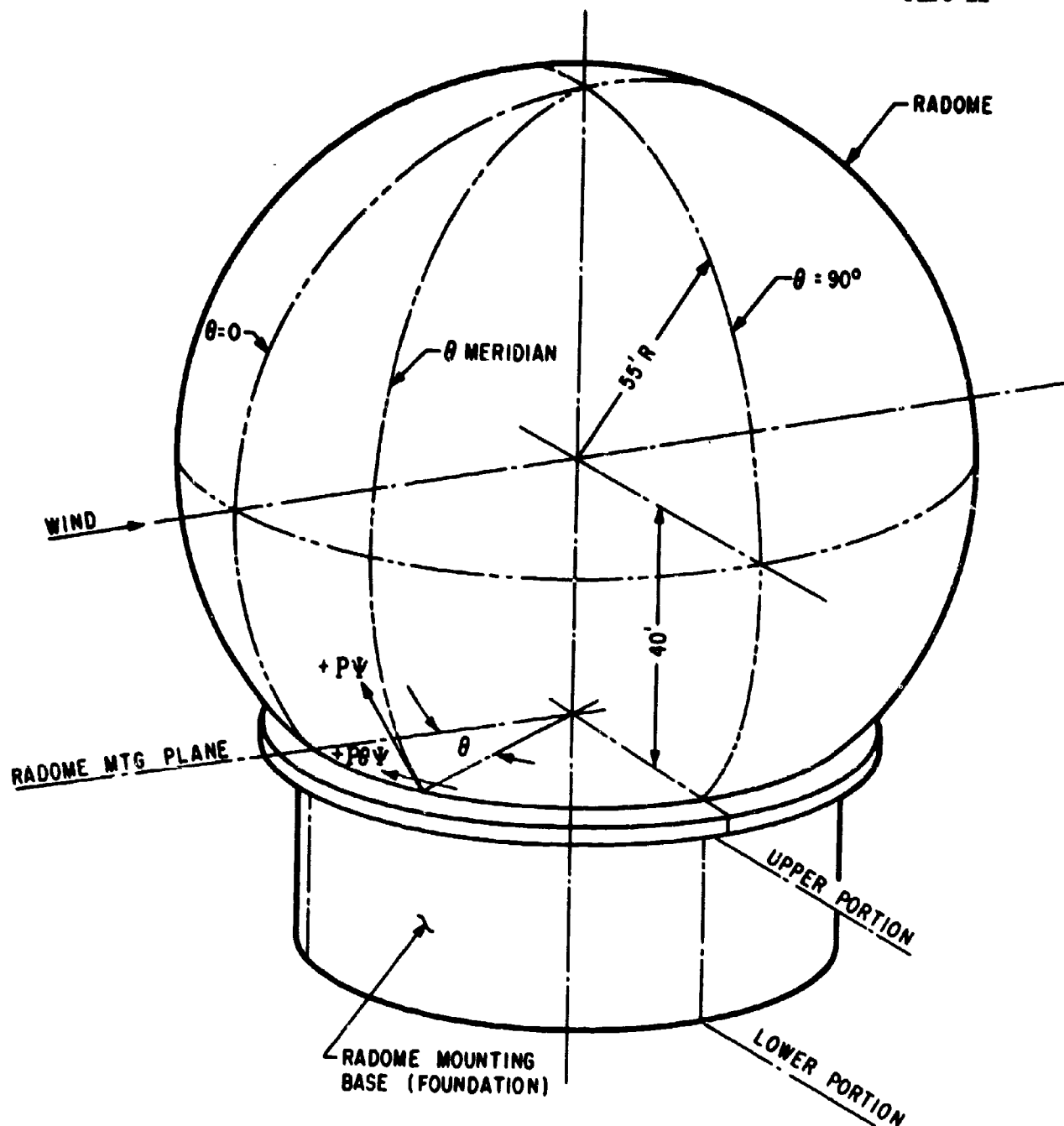
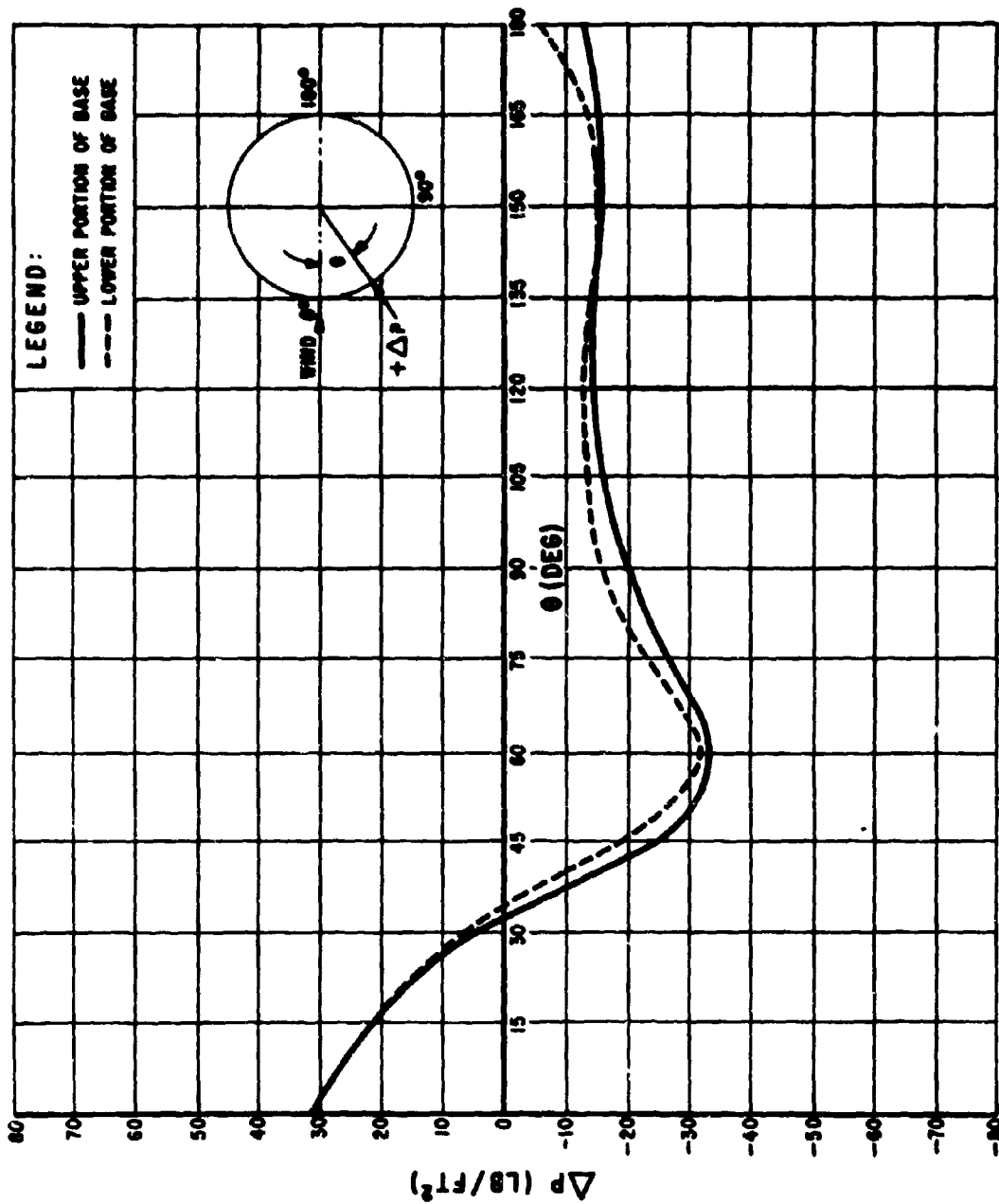


FIG. 4 - 1 RADOME CONFIGURATION



**FIGURE 4-2
RADOME BASE PRESSURE DISTRIBUTION**

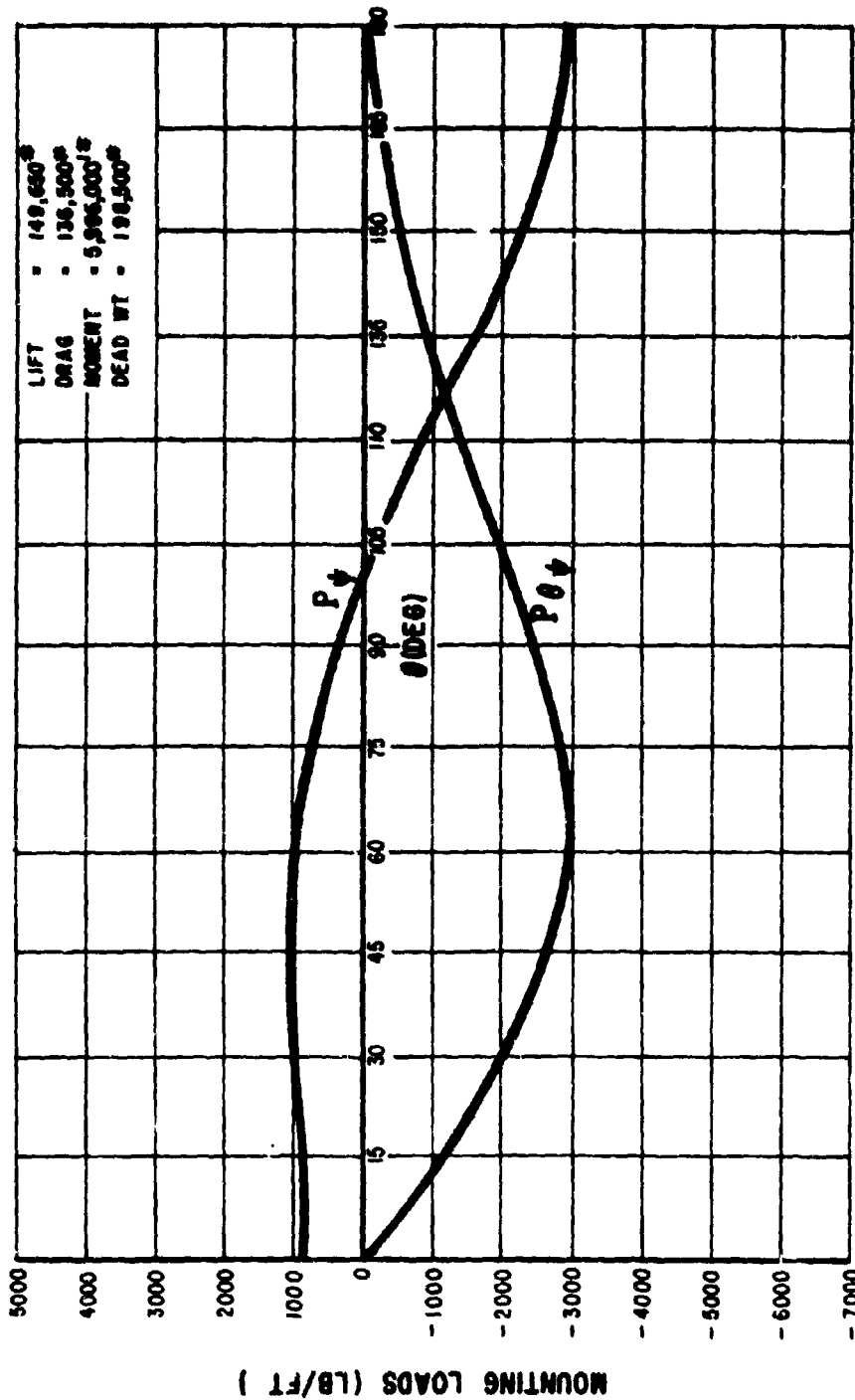


FIGURE 4-3
RADOME MOUNTING - BASE LOAD DISTRIBUTION

Movement of individual radome bearing plates caused by flexural bending of the Radome Support Structure from foundation settlement should not exceed 2 inches. The Radome Support Structure floor should be a concrete slab designed for a maximum wheel load of 10,000 pounds. Minimum slab thickness should be 6 inches. The service door should have an interior locking device to prohibit entrance of personnel during operational periods, to prevent injury from RF radiation.

4.3.4.2 Building Materials. The following describes the materials to be used for construction.

- a. Structure. The entire structure should be reinforced concrete.
- b. Doors. A pair of doors should be provided at the passageway entrance; a rolling door should be provided at the service door as described in Paragraph 4.3.4.1.
- c. Radome Anchors. Steel radome bearing plates with mounting bolts as shown on Drawing 1868-1/113 should be provided. The sizes and locations of bolts and plates should be verified prior to final design.
- d. Ramp. A reinforced concrete ramp should be provided at the service entrance.

4.4 PLUMBING AND FIRE PROTECTION

4.4.1 Plumbing. Plumbing includes potable and industrial water piping, natural gas piping, sanitary waste and vent lines, and plumbing fixtures required for all buildings.

In preparing these criteria it has been assumed that adequate water supply, sanitary drainage facilities, and natural gas supply are available at the site.

4.4.1.1 Potable Cold Water. Potable cold-water piping should be extended from exterior mains to all plumbing fixtures, kitchen equipment, dark-room equipment, hose valves, water heaters, cooling tower, and industrial water system as required.

4.4.1.2 Potable Hot Water. Potable hot-water piping in the COSCB should be extended from water heaters to the plumbing fixtures, kitchen equipment, dark-room equipment, and spray humidifiers, as required, with circulation pump in the return lines. Electric water heaters without circulation pumps should be provided in each Satellite Communications Building.

4.4.1.3 Industrial Water. Industrial water should be provided through back-flow prevention valves from the potable cold-water system, to supply the chilled water systems and hot-water heating systems.

4.4.1.4 Natural Gas. Piping for the non-interruptable service should be extended from exterior mains to all gas-fired equipment in the Kitchen, Scullery, and the boiler pilot lights. Piping for interruptable natural gas should be extended from exterior mains to the boilers.

4.4.1.5 Sanitary Waste and Vent Systems. Sanitary waste and vent lines should be provided for all plumbing fixtures, kitchen equipment, dark room sinks, floor drains, and floor sinks. Sanitary lines should be extended outside of the buildings for connection to exterior mains. It is recommended that underfloor drain lines from drinking fountains be oversized to permit future connection of additional plumbing fixtures to the drainage system with a minimum of cutting and patching.

4.4.1.6 Plumbing Fixtures. All plumbing fixtures should be of standard manufacture for the design use.

4.4.2 Fire Protection. AFM 88-15 requires that fire protection be provided in buildings containing facilities of a critical nature. The TCC is a highly critical facility requiring continuous operation and a high degree of reliability. Inasmuch as the equipment in the technical areas is electronic, the probability of a fire occurring in these areas is small. The prime concern, therefore, is to extinguish or contain fires occurring in the nontechnical areas. However, based on the severe and costly damage that would be caused to the technical collateral equipment in the primary operating rooms through the use of a water system, it is recommended that an operating wet-pipe system be provided for nontechnical areas only. To provide

flexibility for possible nontechnical future use of the present technical areas, it is recommended that the wet-pipe system be installed over these areas, with the sprinkler heads capped. It is recommended that portable hand-operated, carbon-dioxide extinguishers be provided in the technical areas. An automatic carbon-dioxide system is not recommended for the technical areas as it presents a personnel hazard.

4.4.2.1 Wet-Pipe Sprinkler System. Automatic wet-pipe, fusible-link sprinkler systems should be provided within the COSCB, with heads subject to mechanical damage covered by protective cages. In areas of high-heat gain, heads with high ratings should be used.

4.4.2.2 Fire Alarm. A fire-alarm system should be installed as described in Paragraph 4.6.20.

4.5 HEATING, VENTILATING AND AIR CONDITIONING

4.5.1 General

4.5.1.1 Heating, ventilating and air conditioning should be provided in conformance with Air Force Manuals 88-8 and 88-15. Outdoor design conditions are based on information obtained from the U.S. Air Force.

4.5.1.2 All areas, except utility spaces, should be air conditioned with a filtered air supply. Technical areas and rooms should be maintained at temperature and humidity conditions necessary for the equipment operation. Nontechnical areas and rooms should be air conditioned as required in Weather Zone B and held to the same conditions as the technical areas, with less precise controls, to maintain the building environment. Air-conditioned areas should be maintained at a positive pressure with respect to site barometric pressure. Toilets, Kitchen, Scullery, mechanical and electrical equipment rooms, Shipping and Receiving, and nontechnical storage areas should be heated and mechanically ventilated.

4.5.1.3 It is recommended that systems serving the technical areas be sized to include a nominal increase in technical collateral equipment loads in addition to the basic loads shown on the TCE list in Part I of these criteria. This recommendation is based on past experience which has shown that technological advances prior to final construction and during facility operation have required increased capacities of facility systems, thereby necessitating building modifications where initial additional capacity had

had not been provided. For example, the Computer Room air conditioning system at the Vandenberg Tracking Station was sized for an initial 160 ton load which was later increased 70 tons for a total of 230 tons, and the Computer Room at the New Hampshire Development/Operational Tracking Station had a 55 ton increase, going from 145 to 200 tons.

The facility systems in the TCC have therefore been sized to reflect a similar anticipated increase in loads.

4.5.1.4 The Flow and Control Drawing, No. 1868-1/114, included as part of these criteria, indicates the recommended methods and points of control, extent and zoning, and the general paths of air flow for the technical area air systems.

4.5.2 Design Conditions

4.5.2.1 Outdoors

a. Summer

Dry Bulb 95 degrees F.

Wet Bulb 78 degrees F.

Daily Range 28 degrees F.

b. Winter

Dry Bulb Minus 15 degrees F.

Specific Humidity 1 Grain per pound of dry air

Average wind velocity 10 mph

c. Barometric Pressure

Site barometric pressure 28.80 inches of mercury

4.5.2.2 Indoors

a. Technical Equipment Rooms

- | | |
|-------------------------------------|--------------------|
| (1) Temperature control point | 72 degrees F. DB |
| Allowable deviation | ± 2 degrees F. |
| (2) Relative humidity control point | 45 per cent |
| Allowable deviation | ± 5 per cent |

b. Computer Equipment (under floor supply)

- | | |
|--|--------------------|
| (1) Entering temperature control point | 60 degrees F. DB |
| Allowable deviation | ± 2 degrees F. |
| Allowable rise | 25 degrees F. |
| (2) Entering relative humidity control point | 55 per cent |
| Allowable deviation | ± 5 per cent |

c. Nontechnical Rooms (with exceptions below)

- | | |
|-------------------------------------|--------------------|
| (1) Temperature control point | 72 degrees F. DB |
| Allowable deviation | ± 2 degrees F. |
| (2) Relative humidity control point | 45 per cent |
| Allowable deviation | ± 10 per cent |

d. Toilet Rooms, Kitchen and Scullery

70 degrees F. minimum winter DB temperature.

e. Shipping, Receiving and Storage

55 degrees F. minimum winter DB temperature.

f. Radome Support Structure

Sufficient heat to prevent formation of ice on radome
105 degrees F. maximum DB temperature.

4.5.2.3 Air Filtration. Filtration efficiency for air-conditioned rooms should be approximately 100 per cent at 50 microns in the technical areas, and a minimum of 80 per cent by AFI Code procedure in the nontechnical areas.

4.5.2.4 Air Quantities. Supply air quantities should be based on the air-conditioning requirements.

4.5.3 General System Description and Analysis

4.5.3.1 Heating and Cooling Plants. For the precision of control required for these facilities, it is recommended that hot and chilled water be utilized as the heating and cooling media. Chilled water should be produced in a central refrigeration plant, for use by the air-handling equipment in the Central Operations and System Control Building and in the Satellite Communications Buildings. Hot water should be produced by boiler plants in each building, for use by the air-handling equipment serving that building only.

An economic analysis of central refrigeration and boiler plants for the entire TCC including the accompanying distribution piping, versus a single plant for the COSCB and separate ones for each SCB, influenced the recommendation with consideration given to such irreducibles as less and easier maintenance, more reliability, et cetera.

A further cost analysis of schemes employing two, three, and four chillers, reciprocating or centrifugal according to the provisions of AFM 88-15, with the additional requirement that the critical cooling load be carried with one chiller inoperative, has shown a recommendation of three centrifugal machines to be the most economical. A study of boilers, based on the provisions of AFM 88-8, resulted in a recommendation of three boilers in the COSCB and two in each SCB.

Inasmuch as these studies have been based on the best available information and estimated TCE loads, a similar analysis should be made during final design of the facility, and any changes dictated by the results of the final studies should be incorporated into the final design.

4.5.3.2 Technical Areas. Air-handling units should be built-up and located either in the Refrigeration and Fan Room or in roof fan houses. Dew point control should be maintained with sprayed coil dehumidifiers. These are preferred to air washers based on the initial advantages of lower equipment cost, less space requirements, and minimum roof loading.

4.5.3.3 Nontechnical Areas

- a. COSCB. It is recommended that the air-handling systems be multizone, with package air-handling units located in roof fan houses. The less precise humidity control requirement justifies this recommendation over more expensive sprayed coil units; and the location of the units over the areas served justifies this approach over dual duct systems, with the additional advantage of keeping controls out of the ceilings for ease of maintenance. The offices along the exterior walls should be equipped with auxiliary radiation to prevent the occurrence of cold exterior walls during periods of extreme outdoor winter conditions.
- b. SCB. Based on economics, it is recommended that the office be air conditioned as a separate zone from the unit serving the technical areas.

4.5.4 Air-Handling Systems

4.5.4.1 Air-Conditioning Supply - Technical Areas

- a. Air distribution for each technical equipment room should be through a reheat coil and supply ductwork to room ceiling diffusers set in a modular pattern. Return air should pass through registers into a ceiling plenum established for the unit supplying the areas. An auxiliary supply system directly

conditioning specific equipment requiring special cooling, located in the Data Processing and Analysis Room should be basically the same, except that the supply air should travel below the floor into an underfloor plenum, through the equipment, and then discharge into the room. Air-handling equipment, except equipment for the underfloor distribution system, should be located in the roof fan houses in the COSCB and in the SCB Equipment Rooms. Maximum use should be made of the overhead supply system in the Data Processing and Analysis Room to take advantage of greater permissible temperature differentials, hence lower total air quantities.

- b. The air-conditioning units, ductwork, reheat coils, and room ceiling supply and return air outlets should be designed to provide additional air capacity for technological advances and changes in TCE requirements as previously described. In addition, the Roof Fan House for the equipment serving the Central Control area should have ample space for another air-handling system to provide expansion capability.
- c. Equipment for each system should include a mixing box, filters, a sprayed coil dehumidifier with spray water pump, a centrifugal supply fan, reheat coils, ductwork, ceiling diffusers, return registers, and controls. Water treatment for the prevention of algae should be included. Duct lining for thermal and acoustic insulation is recommended.
- d. Air should be introduced into each space through a large number of well-dispersed, high-aspiration ceiling diffusers to afford maximum flexibility in concentrating and deconcentrating the supply.
- e. Controls should include manual start of the supply fan, and interlocks with the automatic temperature control system and spray water pump and the return-exhaust fan as described below. Each air system has an interlock with the local fire-alarm and protection system to stop the supply fan in case of fire as described in Paragraph 4.6.20 of this Basis for Design. Systems serving critical equipment areas should have a fire-damper arrangement to isolate any area in which fire may occur. Dew-point control is recommended by a water thermostat in the sprayed coil basin controlling automatic return and exhaust dampers and a cooling coil valve in sequence, incorporating an economy cycle with outside air override. The zones, as recommended on the Flow and Control Drawing, are controlled by room thermostats and reheat coil valves. Room temperature recorder controllers and humidity recorders, used where recommended on

the drawing, have remote sensing and are centrally located in the Refrigeration and Fan Room.

- f. Systems serving areas containing technical collateral equipment which is absolutely critical should have a stand-by fan and pump for each of the fans and pumps in the system. Control should be by a flow device for automatic operation in the event of primary equipment failure.

4.5.4.2 Air Conditioning Supply - Nontechnical Areas

- a. Air distribution should be through unit mixing dampers and conventional ductwork to room ceiling diffusers. Return air should pass through registers into a ceiling plenum established for the unit supplying the areas.
- b. Equipment for each system should include a mixing box, filters, a package multizone air-handling unit complete with heating and cooling coil, water spray humidifier and zone mixing dampers, ductwork, ceiling diffusers, return registers, and controls. Duct lining as described for the technical areas is recommended.
- c. Controls should include manual start of the supply fan, and interlocks with the automatic temperature control system and the return-exhaust fan as described below. Each system has an interlock with the local fire-alarm and protection system to stop the supply fan in case of fire as described in Paragraph 4.6.20. A cold plenum thermostat should control automatic return and exhaust dampers and the cooling coil valve in sequence incorporating an economy cycle with outside air override. The unit serving the Briefing Room as one of its zones should go to a higher minimum outside air setting under control of a manual switch located in that room. A humidistat in the cold plenum controls the water spray valve, and a hot plenum thermostat reset by an outside air thermostat controls the heating coil valve. The zones controlled by room thermostats and mixing damper motors should be selected for compatible exposure and type of operation.

4.5.4.3 Air-Conditioning Return-Exhaust

- a. One such system should be employed for each air-conditioning supply system to move the air from the ceiling plenum back to the mixing box, to the outside, or a combination of both. Each system should be sized for a maximum of 90 per cent of the air quantity of the supply system with which it is associated for

ventilation and pressurization, with the exception of the underfloor computer equipment systems which should be sized for 100 per cent of the supply. Those associated with supply systems which are oversized for the contingency of increased TCE should be similarly oversized.

- b. Each system should consist of a centrifugal fan, ductwork, roof exhaust, and controls. Duct lining, as described for the supply systems is recommended except for those portions acting as exhaust only.
- c. Controls should consist of a fan interlock with its associated supply fan, and automatic return and exhaust dampers in the economy cycle control as described above. Relief of pressurization of air-conditioning systems should be from the ceiling plenum to atmosphere through pressure relief backdraft dampers. In the COSCB the pressurization air should first pass through the corridor and then through a register into the ceiling plenum to achieve corridor conditioning.

4.5.4.4 Exhaust Systems. Power roof ventilators should be employed to preclude the necessity of forming openings in the "tilt-up" wall panels. Wall propeller fans may be used in the metal panel exterior walls of the roof fan houses.

- a. Toilets, conference rooms, mechanical and electrical equipment rooms, Kitchen, Scullery, and the Publications and Reproduction Room should be ventilated in conformance with AFM 88-15.
- b. In addition, exhaust systems should be included for the following:
 - (1) A griddle and fryer hood exhaust in the Serving Area of the Cafeteria, similar to the Kitchen range hood system.
 - (2) Summer ventilation systems in both the Shipping and Receiving and Storage Rooms to limit the temperature rise to 10 degrees F.
 - (3) Ventilation to prevent stagnation in the Cafeteria Storage Room and the Classified Vault.

4.5.4.5 Radome Structure Ventilation. Provision for future ventilation equipment should be made by providing two wall openings, 180 degrees apart, closed with knock-out panels.

4.5.5 Heating

4.5.5.1 Boiler Plants

- a. Central Operations and System Control Building. Hot-water boilers and appurtenances should be located in the Boiler Room to provide the heat source for the entire building including the ultimate load.
 - (1) Boilers. The Boiler Room should have three (3) boilers, each sized for 50 per cent of the ultimate load, fired with interruptable gas or stand-by light oil, with mechanical draft.
 - (2) Pumps. Three (3) main heating water pumps are required, each sized for 50 per cent of the ultimate load to provide stand-by capacity necessary for the technical areas. The auxiliary heating pump does not require stand-by.
 - (3) Expansion Tank. A closed-type expansion tank for the entire system is recommended.
 - (4) Piping. Piping should be sized for the ultimate load.
 - (5) Controls. The boilers should be manually energized with each having low water cut-off and alarm, operating and high-temperature controls, burner and flame failure controls, including both pre- and post-air purge. All water pumps should be manually started. The stand-by water pump should be automatic starting if the one pump fails. The heating water system pressure should be maintained by a pressure control valve on the water make-up connection.
 - (6) Fuel System (Light Oil). Fuel oil storage should be provided in a tank buried below grade. This fuel system should supply both the stand-by capability for the heating boilers and the fuel source for the anticipated stand-by diesel generators.

b. Satellite Communications Buildings. Hot-water boilers and appurtenances should be located in the Equipment Rooms to provide the heat source for each of the Satellite Communications Buildings.

- (1) Boilers. It is recommended that the Equipment Room in each building have two (2) noninterruptable gas-fired hot-water boilers or light oil-fired hot-water boilers with mechanical draft, 100 per cent capacity each, to provide the heat source for the building.
- (2) Pumps. Two (2) pumps, each sized for 100 per cent of the ultimate load to provide full stand-by capacity, should be provided for the technical areas. The stand-by pump should be automatic starting if the first pump fails.
- (3) Expansion Tank. A closed-type expansion tank for the entire system is recommended.
- (4) Piping. Piping should be sized for the ultimate load.
- (5) Controls. The boilers should be manually energized with each having low water cut-off and alarm, operating and high-temperature controls, burner and flame failure controls, including both pre- and post-air purge. All water pumps should be manually started. The heating water system pressure should be maintained by a pressure control valve on the water make-up connection.

4.5.5.2 Auxiliary Heating Water System. In addition to the constant temperature heating water supply to the air-handling units, an auxiliary two-pipe reverse-return distribution system should extend around the periphery of the COSCB. The pump for this system should be located in the Boiler Room. Water temperature should be maintained by a three-way valve on the pump suction, mixing return and boiler water under the control of a supply water thermostat, reset by an outside air thermostat. The pump should start when the mixing valve positions to allow flow into the system from the boiler header. Heat distribution equipment for the system should include the following.

- a. Pipe Fin Radiation. Pipe fin radiation (with manual enclosure damper control) in each office and toilet room with an exterior exposure, the Female Locker Room, and in corridors on each side of exterior doors.
- b. Unit Heaters. Unit heaters (with fan motors controlled by room thermostats) in mechanical and electrical equipment rooms, Cafeteria Storage, Kitchen, Shipping and Receiving Room, and Storage Area.
- c. Tempering Coils. Tempering coils on the outside air intakes for the Kitchen, Serving Area, and Scullery exhaust systems.
- d. Unit Ventilators. Unit ventilators on 100 per cent recirculation (with fans controlled by water flow switches) along the walls on each side of the glass wall of the Lobby.

4.5.5.3 Miscellaneous Heating Water Equipment

- a. Unit Heaters. Unit heaters in the COSCB roof fan houses and and in the SCB equipment rooms should be supplied from the heating water distribution system which supplies the air-handling systems' heating coils. The fan motors should be thermostatically controlled.
- b. Pipe Fin Radiation. Pipe fin radiation in the SCB Office, Vestibule, and Technical Storage Room should be controlled manually by valve or enclosure dampers.

4.5.5.4 Electric Heating. The Antenna Support Structure should be provided with electrical outlets for heating devices to be provided and installed by the Installation Contractor for heating the interior of the radome.

4.5.6 Chilled-Water Refrigeration Plant

One plant located in the COSCB should serve the entire TCC. Components and their locations should be as follows.

4.5.6.1 Chillers. It is recommended that three centrifugal machines be located in the Refrigeration and Fan Room and connected in parallel so that any two may operate immediately under emergency power conditions without necessitating control resetting. Each chiller should be sized for one-third of the initial load with space allocated in the room for a future chiller when required for increased TCE loads. The critical refrigeration load must be carried with one chiller inoperative.

4.5.6.2 Cooling Tower. A multicell wood or multifan steel tower should be located on grade outside the COSCB adjacent to the Refrigeration and Fan Room. A concrete sump extending below grade, with a capacity below the frost line equal to 150 per cent of the tower basin, should be poured contiguous with a wood tower concrete basin or a steel tower concrete pad. Initial cooling tower capacity should be adequate for initial and future chillers, and must be such that the critical refrigeration load is carried with one tower fan inoperative as a stand-by provision.

4.5.6.3 Condenser Water Pumps. Three vertical centrifugal sump-type pumps should be located in the cooling tower sump with the motors at grade. Each pump should be sized for 50 per cent of the initial requirement to provide necessary stand-by for the technical systems, with space allocated for one future pump to work with the future chiller.

4.5.6.4 Chilled-Water Pumps. Three horizontal centrifugal pumps should be located in the Refrigeration and Fan Room. Each pump should be sized for 50 per cent of the initial requirement to provide necessary stand-by for

the technical systems, with space allocated for one future pump to work with the future chiller.

4.5.6.5 Piping. Both chilled and condenser water piping systems should be sized for the initial total load plus any planned future requirements, with blanked-off connections for the future equipment. Condenser water piping should be designed to be completely free draining to the tower sump to prevent freezing. Condenser water bleed should be indoors.

4.5.6.6 Expansion Tank. A closed-type tank should be located in the Refrigeration and Fan Room, and sized for the volume of the ultimate chilled-water system.

4.5.6.7 Controls

- a. Chiller. Chiller should have inlet vane capacity reduction and standard oil, refrigerant, water, and motor temperature and/or pressure safety controls.
- b. Condenser Water Temperature. Condenser water temperature should be controlled by a tower sump thermostat staging the two-speed fans of a wood tower or modulating the discharge dampers of a steel tower. The condenser water pumps should have the stand-by pump controlled by a flow device to operate if either of the other two pumps fail.
- c. Chilled Water Temperature. Chilled water temperature should be controlled by a supply water thermostat varying chiller capacity with varying load conditions. The sequence starting of the entire refrigeration system should be controlled by the chilled-water thermostat and an outside air thermostat. System pressure should be maintained by a pressure control valve on the make-up water connection. Stand-by pump operation should be similar to the condenser water system.

4.6 ELECTRICAL

4.6.1 Interior Electrical Installations

4.6.1.1 Scope of Work. Interior electrical installations include grounding, lighting, power, communications and instrumentation facilities as required within all structures of the MIDAS Tracking and Control Center. Electrical work and equipment should conform with standard and military codes and specifications.

4.6.2 Services and Service Equipment

4.6.2.1 Feeder and Transforming Equipment. The Central Operations and System Control Building should be served by two underground 4160-volt, 3-phase primary services, one designated as "normal" and the other as "stand-by". Two separate primary circuits are recommended to provide greater flexibility, rather than a single-looped feeder with sectionalizing devices. This is especially true under conditions where it is necessary to isolate or segregate absolute critical power loads. The utilization voltage for the various lighting, power and technical collateral equipment loads in the COSCB would be transformed from the primary voltage by load-center unit substations with electrically operated, draw-out type, secondary circuit breakers. Units supplying absolute-critical, critical and noncritical loads would be duplex-type (spot network), with secondaries paralleled to assure continuous service to absolute-critical loads when an outage occurs on one primary circuit. Main breakers would be equipped with reverse

current relays and tie breakers provided as required for secondary selection. Units supplying strictly noncritical loads would be single-transformer assemblies with manually operated incoming-line selector. A storage battery of ample capacity should be provided for actuating the electrically operated switchgear. Utilization of standard duplex (double-ended) unit substations is recommended to provide full transformer backup for critical loads and feeder selection capabilities. This requires fewer units and therefore reduces the necessary floor space. Since there will be no critical loads during the R&D stage, one full-capacity transformer should be installed initially. Provision should be made for space and bussing only to facilitate the future installation of the tie circuit breakers, where required, and the second transformer unit in each assembly when the TCC becomes operational. The same reasoning would be applicable to conductors of the "stand-by" primary feeder circuit, with conduit only being initially installed. The three Satellite Communications Buildings should each be served underground at primary voltage by individual feeders to single integral distribution centers with step-down transformer and molded case secondary circuit breakers. "Stand-by" service to the SCB's is not required.

4.6.2.2 Service Disconnecting Means. Main primary service disconnecting devices at the COSCB should be manually operable, unfused no-load-break, enclosed air interrupter switches, located in the main Electrical Equipment Room near the point of service entrance. Suitable interlocks should be provided between the primary circuit feeder distribution switchgear,

exterior to the COSCB (not in this contract), to prevent opening under load. Individual load-center unit substations should be provided with fused, load-break, air interrupter switches to each transformer. Main service disconnecting devices at the Satellite Communications Buildings should be fused, load-break, air interrupter switches, located in the Integral Distribution Center assemblies.

4.6.2.3 Voltage Characteristics. Utilization voltage for lighting, general purpose convenience outlets and small fractional horsepower motors should be 120/208 volts, 4 wire, 3 phase. Utilization voltage for major power loads should be 480 volts, 3 phase. It is recommended that the utilization voltage for large refrigeration compressor motors be 4160 volts, 3 phase. This voltage is economically justified, as it precludes the necessity for greater unit substation step-down transformer capacities, and motor control center bus and starter requirements.

Technical collateral equipment specifically requires 120 volts, 1 phase, and 120/208 volts, 4-wire, 3-phase supply characteristics.

The fundamental frequency of all voltages referred to is 60 cycles per second alternating current.

4.6.3 Load Classification

The various loads are further defined as follows.

4.6.3.1 Noncritical. Loads not essential to station technical functions and which could sustain a prolonged outage. Included are administration

area lighting and receptacles, certain technical area office lighting, 75 per cent of technical equipment area lighting, kitchen and dining area lighting, food preparation equipment, and various nontechnical area heating and ventilating units.

4.6.3.2 Semicritical. Loads which could sustain an outage up to 10 or 15 minutes' duration. Included are the three Satellite Communications Buildings, and certain technical area heating and ventilating system components.

4.6.3.3 Critical. Loads which can sustain the minimum outage time required for the starting and synchronization of stand-by power sources and the necessary switching operations. Included are 25 per cent of the technical equipment area lighting, specific heating and ventilating system units and a portion of technical collateral equipment.

4.6.3.4 Absolute Critical. Loads which must be kept operational without interruption. Included are specific technical collateral equipment units such as memory circuits. The extent of this requirement should be determined during final design stage, as loss of power for only a few moments can result in serious malfunction of equipment.

4.6.3.5 Automatic timing devices and interlocks should be utilized to select and disconnect noncritical, semicritical and critical loads, in order, until such time that sufficient power is available for resumption of normal operating conditions.

4.6.4 Basis for Maximum Demand Load

Estimated maximum demands are based on the following demand factors and allowance for spares.

<u>Load</u>	<u>Normal Condition</u>	<u>Emergency Situation</u>
Lighting (TCE areas)	1.0	0.25
Lighting (noncritical)	1.0	0.0
Receptacles and spare circuits	0.5	0.0
Noncritical power	1.0	0.0
Semicritical, critical and absolute critical power	1.0	1.0

4.6.4.1 Spare circuits are rated 1,000 watts for future connected loads. Receptacle circuits are calculated for the specific load or at 200 watts per outlet where the specific load is unknown.

4.6.5 Estimated Demand Loads (kva). Due to the rapid development of TCE, the uncertainty of the exact TCE to be used in this facility, and past experience where TCE loads radically increased during the course of construction and operation, it is recommended that an allowance for increased electrical loads be provided for throughout the TCC.

The estimated demand loads tabulated below include capacity for future TCE demands and related air-conditioning requirements.

4.6.5.1 Central Operations and System Control Building

<u>Utilization Voltage</u>	<u>Absolute Critical</u>	<u>Critical</u>	<u>Semi- Critical</u>	<u>Non Critical</u>	<u>Total</u>
120 Volt 1Ø TCE Power	315.9	303.5	-	101.1	720.5
120/208 Volt 4W. 3Ø TCE power	345.0	44.2	-	20.0	409.2
120 Volt 1Ø Lighting	-	22.8	-	232.45	255.25
120 Volt 1Ø Receptacles & Spares	-	1.15	-	77.4	78.55
120 Volt 1Ø Fractional Motors & Miscellaneous	-	-	-	22.55	22.55
120/208 Volt 4W. 3Ø Kitchen Equip.	-	-	-	29.5	29.5
480 Volt 3Ø Power	59.0	578.9	-	176.5	814.4
4160 Volt 3Ø Power	-	455.0	-	227.5	682.5
Totals	719.9	1405.55		887.0	3012.45

4.6.5.2 Satellite Communications Building, Antenna and Radome Support Structures (three required)

<u>Utilization Voltage</u>	<u>Semicritical</u>	<u>Noncritical</u>	<u>Total</u>
120 Volt 1 ϕ TCE Power	87.6	-	87.6
120/208 Volt 4W. 3 ϕ TCE Power	30.0	-	30.0
120 Volt 1 ϕ Lighting	0.8	9.9	10.7
120 Volt 1 ϕ Receptacles & Spares	1.55	4.05	5.60
120 Volt 1 ϕ Fractional Motors & Miscellaneous	1.4	1.0	2.4
120/208 Volt 4W. 3 ϕ Radome Heating	100.0	-	100.0
208 Volt 3 ϕ Power*	26.2	-	26.2
Totals	247.55	14.95	262.5

4.6.6 Stand-by Power Requirements (kva)

On-site 4160-volt, 3-phase power generating facilities should be made available for the TCC in operational status as follows:

4.6.6.1 Central Operations and System Control Building

a. Absolute Critical, Critical and Semicritical Loads

*Small load does not justify provision of 480 volts for power.

(1) Basic load	1534.6
(2) Spare capacity for future TCE and air-conditioning requirements	<u>582.5</u>
Total	2117.1

4.6.6.2 Satellite Communications Buildings (3)

a. Semcritical Loads

(1) Basic load	207.35
(2) Spare capacity for future TCE (future air-conditioning requirements as included in basic load)	<u>40.2</u>
Total	247.55 (each)

4.6.6.3 Total Stand-by Power Requirements

a. <u>Basic Loads</u>	1949.3
b. <u>Spare Capacity</u>	<u>662.9</u>

Grand Total (COSCB and 2 SCB's) 2612.2

4.6.7 Motor Control Centers

Motor control centers should conform to the National Electrical Manufacturers' Association Type B construction, and utilize combination circuit breaker and starter units. For motors less than 50 horsepower starting loaded, and motors 100 horsepower or less starting unloaded, the starter units should be across-the-line magnetic type. For motors 50 horsepower or larger starting loaded, starters should be reduced voltage, closed transition, auto-transformer type. Space should be provided in the motor control centers for future equipment as indicated on the single-line diagram, and the

assembly designed to provide breakers with adequate interrupting ratings for the available short-circuit current. For motors 200 horsepower or larger starting unloaded, the starter units should be across-the-line, medium voltage (4160 volts) type in a separate enclosure with incoming line selector, air-interrupter switch, current limiting fuses, air-break contactors and ambient-compensated overload relays.

4.6.8 Motors. Motors 1/2 horsepower or larger (up to 175 horsepower) should be connected 480 volts, 3 phase, with the exception of all motors in the SCB's and certain items of food preparation equipment in the COSCB. Motors 200 horsepower or larger should be connected 4160 volts, 3 phase. Motors less than 1/2 horsepower and integral-unit kitchen appliances should operate at 120 volts, single phase. Motors 1/2 horsepower or larger in the SCB's should be connected 208 volts, 3 phase.

4.6.9 Distribution Panelboards. Branch-circuit panelboards should be circuit-breaker type, dead front, with lugs only in mains. Panelboards should consist of two or more sections, if required by circuitry. Technical collateral equipment power panelboards should be surface type, and equipped with single and multipole branch circuit-breaker units of 100 ampere minimum frame size as required. Three 1-inch empty conduits should be provided from flush-mounted lighting and receptacle panels, extending into the ceiling space, to facilitate future modifications or additions. Lighting and receptacle panels should be designated as "critical", "semicritical", and "noncritical". Where technical collateral equipment panels occur above depressed slabs, one

4-inch by 8-inch-wide wireway, with screw-attached cover, should be provided from each panel, extending through the floor into the depressed slab areas. Technical collateral equipment panels should be designated "noncritical", "critical" and "absolute critical" as required. Tripping devices, with control stations in the Data Analysis area, should be provided on all TCE feeder circuit breakers serving panels with computer loads.

4.6.9.1 Spare breakers should be provided in lighting and receptacle panels equal to 10 per cent of the circuits used in the initial installation. Feeder capacities should be determined on the basis of estimated maximum demand, plus 10 per cent for normal growth of loads within the area or building served.

4.6.9.2 Spare breakers equal to 10 per cent of the circuits to be initially used should be provided in technical collateral equipment power panels. Space and bussing only, equal to 40 per cent of the initial installation, should be provided to facilitate the installation of future breakers. Feeder capacity should be determined on the basis of the initial maximum demand, plus 50 per cent. Feeders to "absolute critical" technical collateral equipment panels should be plug-in busduct, and arranged for maximum flexibility in respect to possible relocation of load points by future modification or addition of equipment. Extension of branch circuit wiring from TCE panels to the technical collateral equipment is not included in this contract, but will be accomplished by an independent equipment installation contractor.

4.6.10 Receptacles. Plug-in receptacles should be in accordance with Figure 2.1 of Part I of these criteria to match attachment caps on specific items of technical collateral equipment. General purpose receptacle outlets should be installed not more than 15 feet apart along the floor line of usable wall space in all rooms except storage areas, mechanical and electrical equipment rooms, corridors, toilet and locker rooms, et cetera, where a minimum of receptacles should be installed for utility and maintenance functions. A 30-ampere food warmer receptacle should be provided in each SCB. Special purpose receptacle outlets should be installed as specifically required. Heavy-duty receptacles should be provided for electric heat in the radome; method and type of heating units should be determined during final design. Separate 20-ampere, 120-volt circuits should be provided for each teletype machine power supply receptacle.

4.6.11 Emergency Lighting Units. Self-charging, battery-operated, automatic-cutover type, wall-mounted units should be provided for emergency lighting in corridors and strategic locations throughout the buildings.

4.6.12 Exit Lighting. Illuminated exit signs should be provided in each building as required to define normal exit routes. The exit lighting system should be served by circuits from "critical" grade lighting panels in the COSCB, and by a connection ahead of the main secondary service circuit breaker in each of the three SCB's.

4.6.13 General Lighting. All lighting throughout each building should be served by 120/208-volt, 4-wire, 3-phase systems, with fixtures and foot-candle intensities as listed below.

<u>Area</u>	<u>Intensity</u>	<u>Fixture Descriptions</u>
Offices and Technical Collateral Equipment Areas	50	Louvered commercial type fluorescent, with RF line filters and RF shielding in the SCB's and RF line filters only in the COSCB.
Dining Room	30	Louvered commercial-type fluorescent with RF line filters only.
Corridors	10	Louvered commercial type fluorescent with RF line filters only.
Toilet Rooms	10	Ceiling-mounted, incandescent, opal glass bowl.
Kitchen	30	Ceiling-mounted, incandescent, opal glass bowl.
Serving Area	50	Recessed incandescent with prismatic lens.
Mechanical and Electrical Equipment Rooms and Antenna Support Structures	20	Industrial incandescent, RIM dome reflectors.
Scullery	10	Vaportight, dome reflectors.
Storage and Supply Rooms	10	Industrial incandescent, RIM dome reflectors.
Communications Equipment Room	30	Industrial incandescent, RIM dome reflectors.
Exterior Doorways	-	Weatherproof bracket, incandescent, prismatic glass globe.
Radome	-	Incandescent reflector floodlights on adjustable swivels at each quadrant of antenna base for maintenance and general illumination.

Approximately one-fourth of the lighting fixtures in technical collateral equipment areas should be in deployed arrangement, and served from "critical" grade lighting panels to provide minimum functional lighting during periods when the normal commercial supply or full capacity stand-by power is not available. In certain specific occupancies, such as Tracking Control, Crypto, Switchboard Room, Central Control and Mezzanine Projection Room, all lighting shall be of "critical" status. All remaining lighting facilities, except exit signs, should be automatically disconnected during emergency periods.

4.6.14 Special Lighting. Special lighting requirements for individual rooms or areas shall be as tabulated below.

<u>Room Designation</u>	<u>Requirements</u>
Tracking Control	Fluorescent fixtures, 50 foot-candles; one-half switched and one-half with motorized dimmer controls.
Central Control	Solid-panel, low-brightness, luminous ceiling with fluorescent fixtures over approximately one-half of the area, 50 foot-candles; one-half switched and one-half with motorized dimmer controls. Prismatic dome reflectors (work lights) in balance of area, 15 foot-candles. Baffled cylindrical downlight, flush with luminous ceiling, over each control console. Step-lights in console platform risers.
Projection Room and Projection Booth	Recessed incandescent fixtures with prismatic lens, 30 foot-candles; manual dimmer control.
Observation Room	Recessed incandescent fixtures with prismatic lens, 20 foot-candles; manual dimmer control in Projection Room.
Dark Room	Incandescent ceiling fixtures with lock switch 6 feet above floor; safelights with exterior warning light above doorway at light-lock entry.

Room Designation

Requirements

Viewing Area

Fluorescent fixtures, 25 foot-candles, with manual dimmer control in Projection Booth.

Radome

Separate circuit for aircraft obstruction warning lights.

4.6.15 Wiring Methods and Materials. Wiring systems should be installed in accordance with requirements established under Paragraph 4.6.1.1 of this report.

4.6.15.1 Exposed raceways, raceways subject to severe physical damage, or raceways in or under concrete slabs should be rigid, zinc-coated, steel conduit. Steel conduit should extend 5 feet from building lines for connection to underground systems.

4.6.15.2 Communication and instrumentation ducts should be 4-inch-round asbestos-cement or impregnated fiber conduit, arranged in concrete-encased banks not less than 2 feet below floor slab or grade. Bends should have a minimum radius of 72 inches.

4.6.15.3 Voltage Drop

- a. The total secondary voltage drop for 480-volt power circuits should not exceed 5 per cent, with 3 per cent for feeders and 2 per cent for branch circuits.
- b. The total secondary voltage drop for 120/208-volt lighting and receptacle circuits should not exceed 3 per cent, with 1 per cent for feeders and 2 per cent for branch circuits.
- c. The secondary voltage drop for 120/208-volt technical collateral equipment power circuits should not exceed 1 per cent for feeders. Reference is made to Paragraph 4.6.9.2 for branch-circuit wiring.

4.6.16 Grounding Requirements. Two separate grounding systems must be provided; one for nontechnical power equipment and structural grounding, the other for instrumentation equipment. The systems must be completely isolated, with no metallic connection at any point.

4.6.16.1 Power Equipment Grounding. This system should consist of a bare copper conductor, buried a minimum of 3 feet below grade, in a looped configuration around the periphery of each building, with lateral taps to structural steel columns. Ground rods should be driven at each corner of the buildings, and attachments made to the water service lines. The separate loops of the various buildings should be interconnected. Additional ground rods should be driven as necessary to insure resistance to ground does not exceed 25 ohms. Service equipment, switchgear and neutral busses should be grounded to the building loop. All 480-volt branch circuits should carry an insulated, green-colored, ground conductor in the power circuit conduit from the power source to the driven equipment or load. All 120-volt, 1-phase and 120/208-volt, 3-phase circuits, except TCE panel feeder circuits, will be considered as having an equipment ground via the supplying conduit system. TCE panel feeders should carry a separate, insulated, green-colored, ground conductor in the feeder conduit.

4.6.16.2 Instrumentation Grounding. The system should consist of an insulated copper conductor, buried a minimum of 3 feet below grade, in a radial configuration. Closed loops should be avoided to prevent direct current or low-frequency alternating currents circulating in the system.

Maximum spacing between parallel sections of the radial system should be arranged to preclude the flow of radio-frequency alternating currents.

Minimum size of buried conductors in this system should be 500,000 circular mils.

- a. Instrumentation Grounding Plates. Tapped copper grounding plates, spaced a minimum of 20 feet center to center, should be mounted on walls and interior partitions and on structural columns and test benches in areas with technical collateral equipment. Plates should be isolated from the building by insulators. Direct connection from plates to buried conductors should be as short as possible, and made with insulated copper down-conductors. Resistance to ground from each plate should not exceed one ohm.
- b. Instrumentation Ground Well. A ground well, centrally located at a convenient point, should be provided, and connection made to the instrumentation ground system conductor of all buildings maintaining the radial pattern, with no closed loops. The well should consist of a perforated metal casing extending at least 10 feet below the average subsurface water level, and a one-inch-diameter copper or copper-clad ground rod driven inside the casing to a depth not less than 20 feet below grade. Upper terminus of the casing, ground rod and lateral grounding conductors should be accessible from a concrete handhole with removable cover. Connections to the ground rod should be made with clamp-type fittings. The entire instrumentation grounding scheme should be a one-point system, in effect. A tap from the power equipment grounding network should extend to the handhole with sufficient slack conductor to attach to the ground rod, but NOT be connected.

4.6.16.3 Lightning Protection. Each building should be provided with a master-labeled lightning protection system. Down-conductors should be extended from the radome ring at each quadrant of the Radome Support Structure to facilitate the future connection of built-in lightning protection devices on the radome proper. Down-conductors should be welded

to the power equipment peripheral ground loop. Metal ventilators and stacks should be bonded to the lightning protection system roof conductor.

4.6.16.4 Special Requirements. All underground splices, taps and connections should be made by the exothermic weld process. Closely spaced, long parallel runs between the instrumentation ground system and the power equipment ground system should be avoided to minimize capacitance coupling.

4.6.17 Communications. An interconnecting system of two 4-inch, non-metallic underground ducts must be provided between the COSCB and each SCB, together with terminal cabinets for cross-connections, branch conduit, wall and ceiling service outlets and supplemental equipment, to receive conductors for the following basic communication system requirements.

- a. Interstation automatic-switching dial telephone system for operations, support and administration functions and to toll lines.
- b. Attended telephone switchboard.
- c. Voice-recording equipment.
- d. Operational intercommunication networks.
- e. 20-zone master loud-speaking voice-paging system.
- f. High-speed teletype circuits.
- g. Data transmission circuits.
- h. Leased voice circuits.
- i. National weather circuit.

Twelve 4-inch nonmetallic underground ducts should extend 5 feet beyond the exterior wall of the building from the cable pit beneath the main

6

distributing frame in the Communications Equipment Room to facilitate extension to the commercial communication facilities; reference is made to Figure 4-4. The reliability factor of commercial telephone equipment and facilities will be the responsibility of the local telephone company. Interconnecting ducts between buildings should terminate within the buildings in cable pits or at foundation walls. Ducts should slope to manholes away from the buildings for condensation drainage. Pulling-in irons should be provided in cable pit walls opposite the duct entrances.

Rigid steel conduit, embedded in or below slab floor construction, should be provided between depressed slab areas and terminal cabinets occurring in nontechnical areas, to receive multiconductor communication system cables. Terminal cabinets should be hinged-door, flush type, with 3/4-inch varnished plywood backboards for terminal strips. Three 1-inch empty conduits should be extended into the ceiling spaces from each cabinet to facilitate future modifications or additions.

Conduits carrying communication secure system circuits classified as "secret" should be installed in the attic space over corridors and above removable ceiling panels to facilitate visual inspection.

General purpose communication system wall outlets should be provided at strategic points in the various rooms; surface extensions would be made to specific locations as required. Paging system loud-speaker outlets should be flush, ceiling type, in finished areas.

Conduit and raceway should be 3/4-inch minimum size.

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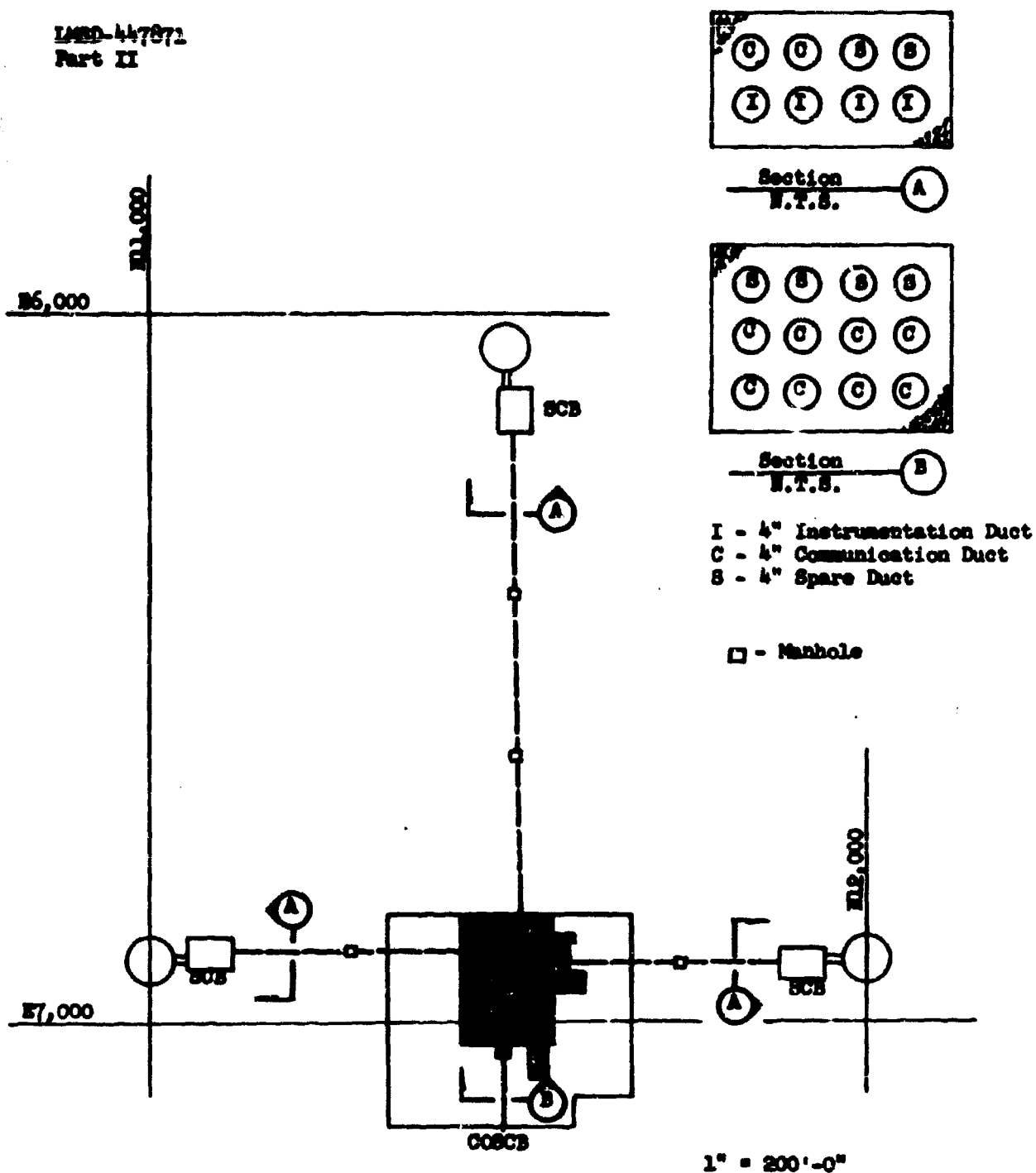


FIGURE 4-4
INSTRUMENTATION AND COMMUNICATIONS DUCTS
BLOCK DIAGRAM
4-64

4.6.18 Instrumentation. Each SCB and the COSCB must be interconnected with six 4-inch nonmetallic underground instrumentation ducts, including two spares. Ducts should be laid in a common bank and terminate in the same manner and location as the communications system ducts described under Paragraph 4.6.17.

4.6.19 Radio Frequency Filters. All electrically operated equipment in the TCC which produces RF interference must be provided with radio frequency line filters. This includes any equipment which has a commutator, slip-ring or any continuous arcing device.

The filter and shielding requirements for fluorescent lighting fixtures are covered under Paragraph 4.6.13.

All shielding and line filters must be effective throughout the entire radio frequency spectrum from RF to UHF. Effectiveness of the over-all noise reduction effort must be such that spurious locally generated radio frequency noise levels in the vicinity of the receiving antenna equipment will be less than 0.1 microvolt/meter in the 300 MC and 2.2 KMC region, when referred to a 10 KC bandwidth.

4.6.20 Fire-Alarm System. A noncoded, electrically supervised, fire-alarm and fire-protection system should be provided.

4.6.20.1 Areas with TCE should be provided with automatic heat-actuated alarm devices. The method and operation (pneumatic or electric) to initiate an alarm should be determined during final design.

Break-glass alarm stations should be provided in the Data Processing and Analysis Area, Communications Equipment Room, and Central Control Area with interlocks to stop air-conditioning system equipment supplying these particular areas in the event of a localized fire.

4.6.20.2 Nontechnical areas with sprinkler systems should be provided with water-flow alarms, valve position and pressure supervisory devices.

Water-flow alarm conditions should be provided with interlocks to stop air-conditioning system equipment only in the areas affected.

4.6.20.3 Supplemental manual fire-alarm stations should be installed at strategic locations throughout the building in rooms and corridors along emergency exit paths.

4.6.20.4 Suitable annunciation and audible signals should be provided at the guard station in the Lobby of the COSCB to indicate location of all alarm initiations or supervisory device actuation.

4.6.21 Area Lighting. Floodlighting should be considered between buildings and structures when they are separated by large distances. It is assumed that the perimeter fence will be provided with a security lighting system.

4.6.22 Radiation Monitoring and Alarm System. A multichannel remote area monitoring system should be provided at each SCB, with sensing elements located in the Radome Support Structures, to measure and indicate stray low energy and soft radiation emitted by the antenna when transmitting and to

actuate visual and audible alarms at predetermined dosage levels. Control panels should be located in the Console Rooms of the SCB's.

4.6.23 Intrusion Alarm System. All fire exit doors in the COSCB requiring security exit control should be provided with contact devices actuating an audible and visual alarm annunciator located at the guard station in the Lobby.

4.6.24 Electrical Distribution. This is not a part of these criteria. It is assumed that 4,000 kva, 4160 volts, 3-phase primary power with a reliability factor of 0.9995, and 2,700 kva, 4160 volts, 3-phase stand-by power will be provided to the site.

4.6.24.1 Single-Line Diagram. The single-line diagram accompanying these criteria is based upon having an on-site generating plant operating in parallel with the utility source; the generating plant providing capacity equal to, or greater than the absolute-critical and critical power requirements. In the event of utility outage, the noncritical and critical loads would be automatically tripped, leaving the absolute-critical load only to be supplied by on-site generation, until additional generating facilities could be started and synchronized, after which time service to critical loads would be restored. In the event that it is not possible or practicable to operate the generating facilities in parallel with the utility source, the following modifications would be required to the single-line diagram.

- a. Provide a tie breaker in each double-ended unit substation supplying absolute-critical, critical and noncritical loads, separating the substation bus into two sections; one section for absolute-critical and critical loads and the other for noncritical loads. Normal operation would be with the tie breaker open. On-site generation would then supply the absolute-critical and critical bus sections of the various unit substations through one radial primary feeder, and the utility source would supply the noncritical bus sections through the other radial primary feeder.
- b. Rearrange the respective loads to be fed from the bus section corresponding to their designation.
- c. Provide means of connecting either power source to either radial primary feeder.

4.6.24.2 Selection of Primary Distribution Voltage. An analysis of the various load classifications as set forth in Paragraph 4.6.3 and the total estimated demand loads tabulated in Paragraph 4.6.5, together with consideration of known conditions at the site, indicates:

- a. Available power at 12 kv (1,600 kva) is inadequate to supply the total maximum demand of the facility.
- b. Full capacity on-site generating facilities will be necessary to provide the degree of reliability required.
- c. It is assumed the 69-kv line will be extended approximately two miles to a location nearer the site (leaving the existing 2,000-kva substation and load intact) with step-down transformation to 4160 volts for distribution. This particular voltage would be utilized direct for large refrigeration compressors, thus reducing size and cost of indoor unit power centers. Additional economy can be achieved by the use of 5-kv-rated cable, switchgear, and on-site generating facilities, instead of the more costly 12-kv equipment.

SECTION 5

UTILITY REQUIREMENTS

The utility requirements included in this section are based on the Part I technical collateral equipment loads and the specific requirements of the Tracking and Control Center. It has been assumed that the existing on-site utilities will be modified, if necessary, to meet the requirements of this program.

TABLE 5-1

STATION POTABLE AND INDUSTRIAL WATER REQUIREMENTS

		<u>Gallons per Day</u>
<u>Central Operations and System Control Building</u>		
Domestic	25,000	
Industrial (Heating, Ventilating and Air Conditioning)	<u>65,000</u>	
		90,000
<u>Satellite Communications Building (3 required)</u>		
Domestic	480	
Industrial (Boiler Blow-down)	<u>50</u>	
Total 1 Building	530	
Total 3 Buildings		1,590
<u>Total Station Requirements</u>		
Domestic	26,480	
Industrial	<u>65,150</u>	
Total		91,590

TABLE 5-2
STATION SEWAGE REQUIREMENTS

	<u>Gallons per Day</u>	
<u>Central Operations and System Control Building</u>		
Domestic	25,000	
Industrial (Heating, Ventilating and Air Conditioning)	<u>27,000</u>	52,000
<u>Satellite Communications Building (3 required)</u>		
Domestic	<u>480</u>	
Total 1 Building	480	
Total 3 Buildings		1,440
<u>Total Station Requirements</u>		
Domestic	26,440	
Industrial	<u>27,000</u>	
Total		53,440

TABLE 5-3
STATION NATURAL GAS LOADS

		<u>Cubic Feet per Day</u>
<u>Central Operations and System Control Building</u>		
Noninterruptable	2,000	
Interruptable	<u>140,000</u>	142,000
<u>Satellite Communications Building (3 required)</u>		
Noninterruptable	<u>7,280</u>	
Total 1 Building	7,280	
Total 3 Buildings		21,840
<u>Total Station Requirements</u>		
Noninterruptable	23,540	
Interruptable	<u>140,000</u>	
Total		163,840

TABLE 3-4
STATION HEATING LOADS

	<u>MBTU/HR</u>
<u>Central Operations and System Control Building</u>	6,300
<u>Satellite Communications Building</u> (3 required at 343 MBTU/HR each)	<u>1,029</u>
Total Net Load	7,329

TABLE 5-5
STATION AIR-CONDITIONING LOADS

	<u>Tons Refrigeration*</u>
<u>Central Operations and System Control Building</u>	600
<u>Satellite Communications Building</u> (3 required at 30 tons each)	<u>90</u>
Total	690

*Theoretical refrigeration tonnage required for the buildings, nontechnical loads, and the technical collateral equipment loads as indicated in Part I of these criteria.

TABLE 5-6

CENTRAL OPERATIONS AND SYSTEM CONTROL BUILDING
ELECTRICAL LOADS

<u>Loads (in kva)</u>	<u>Connected</u>	<u>Demand</u>	<u>Future</u>
TCE Power	783.9	737.5	391.9
Lighting	255.25	255.25	-
Receptacles	118.95	58.9	-
Spares	38.15	19.65	-
Fractional Motors and Miscellaneous	22.55	22.55	-
Kitchen Equipment	42.1	29.5	-
Power	<u>1553.2</u>	<u>1250.9</u>	<u>300.4</u>
Total	2814.1	2374.25	692.3

TABLE 5-7
SATELLITE COMMUNICATIONS BUILDING
ELECTRICAL LOADS

<u>Loads (in kva)</u>	<u>Connected</u>	<u>Demand</u>	<u>Future</u>
TOR Power	80.4	77.4	40.2
Lighting	10.7	10.7	-
Receptacles	7.5	4.35	-
Spares	2.15	1.25	-
Fractional Motors and Miscellaneous	3.4	2.4	-
Radiant Heating	100.0	100.0	-
Power	<u>26.9</u>	<u>26.2</u>	<u>-</u>
Total	231.05	222.3	40.2

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TABLE 5-8
TOTAL TOC ELECTRICAL LOADS

<u>Building Load (in kva)</u>	<u>Connected</u>	<u>Demand</u>	<u>Future</u>
COSCB	2814.1	2374.25	692.3
SCB No. 1	231.05	222.3	40.2
SCB No. 2	231.05	222.3	40.2
SCB No. 3	<u>231.05</u>	<u>222.3</u>	<u>40.2</u>
Total	3507.25	3041.15	812.9

SECTION 6

ORDER OF MAGNITUDE COST ESTIMATE

The following cost data has been assembled for the purpose of estimating the cost of construction of the facilities defined in this Basis for Design.

The estimate is for the new structures and buildings only and does not include any costs for site preparation, roads, outside utility distribution, grading, drainage, et cetera.

The basic costs of materials and labor were estimated on present-day costs prevailing at the construction locality. No allowance has been added for contingencies or possible price increases. Normal construction has been assumed, and no factor has been included for premium cost of an accelerated construction program.

The estimate does not include the cost of preliminary or final design, shop-drawing checks, construction supervision, preparation of "as-built" drawings, or Government administration costs.

TABLE 6-1
COST ESTIMATE SUMMARY*

1. <u>Central Operations and System Control Building</u> (1 required)			
a. Architectural and Structural	\$	1,147,800	
b. Heating, Ventilating and Air Conditioning**		685,570	
c. Plumbing and Piping		113,420	
d. Electrical		499,620	
e. Fire Protection		42,760	
Subtotal			\$ 2,489,170
2. <u>Satellite Communications Building</u> (3 required)			
a. Architectural and Structural	\$	54,500	
(per building)			
b. Heating, Ventilating and Air Conditioning		22,980	
(per building)			
c. Plumbing and Piping (per building)		5,510	
d. Electrical*** (per building)		32,620	
Subtotal	\$	115,610	
Subtotal for 3 Buildings			\$ 346,830
3. <u>Antenna Support Structure</u> (3 required)			
Architectural and Structural (per structure)	\$	30,500	
Subtotal	\$	30,500	
Subtotal for 3 Structures			\$ 91,500
4. <u>Radome Support Structure</u> (3 required)			
Architectural and Structural (per structure)	\$	64,600	
Subtotal	\$	64,600	
Subtotal for 3 Structures			\$ 193,800
TECHNICAL STRUCTURES AND BUILDINGS TOTAL			\$ 3,121,300

*This estimate does not include costs for site preparation, roads, parking areas, security fencing and check houses, exterior utility distribution systems and utility buildings, grading, drainage, power generating plant, master distribution substation, or conduit systems for instrumentation and communication cabling.

**This item includes the cost of the Cooling Tower Basin and Sump.

***This item includes the electrical requirements for the Antenna and Radome Support Structures.

SECTION 7

PROJECT PLANNING SCHEDULE

This section indicates the time periods required for facilities design, construction, and installation of technical collateral equipment, and prove-out of the facilities established in these criteria.

The time periods indicated do not phase the program, but only present the time which must be allocated for the various steps required for project completion. The requirements of the program must dictate the integration of the various design-construction-equipment-installation prove-out phases necessary to produce a complete MIDAS Tracking and Control Center.

PROJECT PLANNING SCHEDULE

		MINIMUM TIME IN MONTHS															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
FACILITIES DESIGN	PRELIMINARY DESIGN AND OUTLINE SPECIFICATIONS ①	■															
	CONSTRUCTION DRAWINGS AND SPECIFICATIONS		■	■	■												
	REASONABLE CONTRACT ESTIMATE				■												
CONSTRUCTION PERIOD	AWARD OF CONSTRUCTION CONTRACT					■	■										
	CONSTRUCTION							■	■	■	■	■	■	■	■	■	■
TECHNICAL EQUIPMENT INSTALLATION AND TEST	ONE S.C.B. AND APPROX. 50 % OF C.O.S.C.B.															■	■
	TWO S.C.B.'S AND REMAINDER OF C.O.S.C.B.																

① FACILITIES CRITERIA SUBMITTED.

③ C.O.S.C.B. AND ONE S.C.B. COMPLETED- INCLUDING ALL NORMAL POWER AND AIR CONDITIONING.

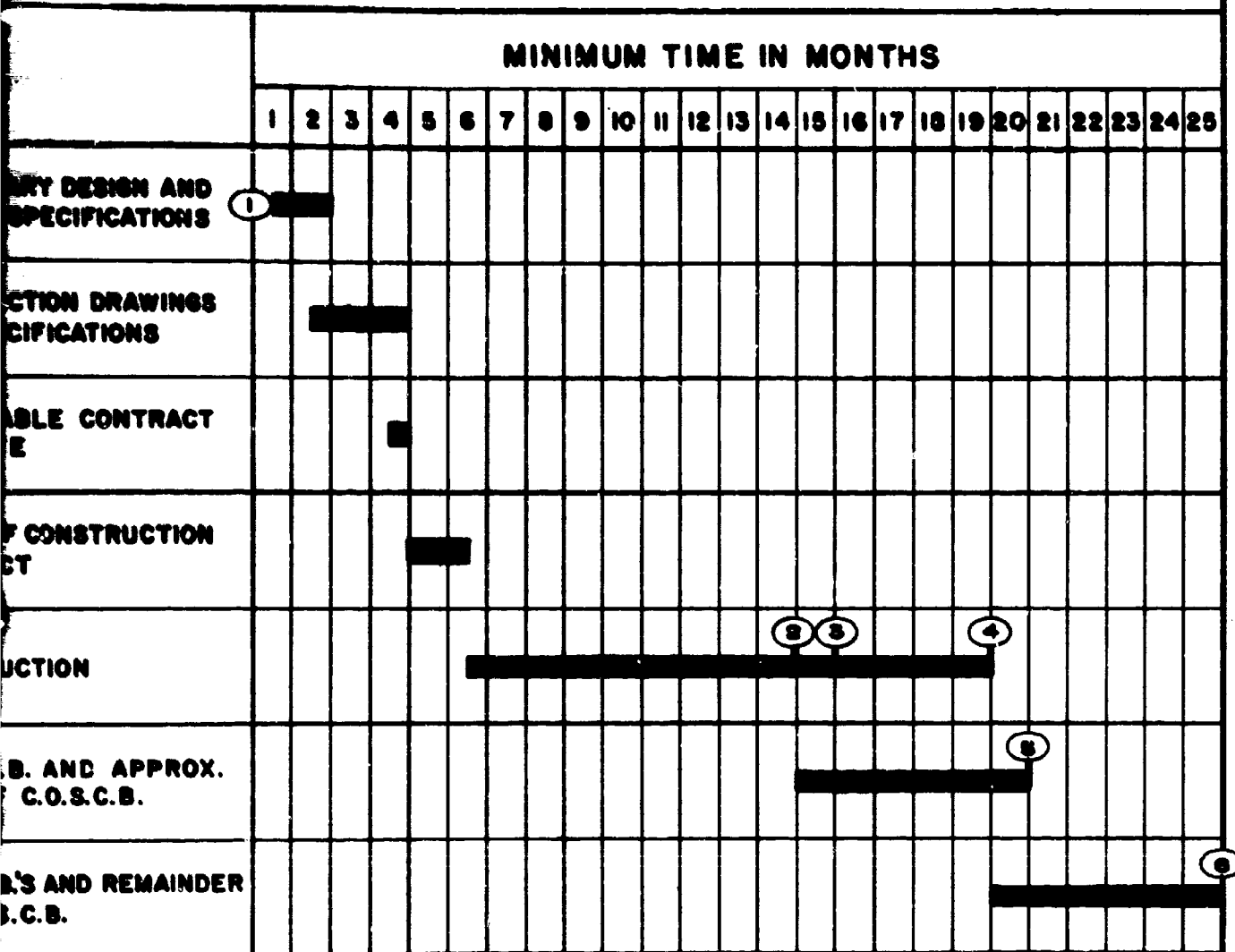
⑤ OPERATIONAL PORTION OF PROVE-OUT

② INITIAL OCCUPANCY OF C.O.S.C.B. AND ONE S.C.B. (EQUIPMENT AREAS FINISHED INSIDE AND TEMPORARY POWER AVAILABLE).

④ ALL CONSTRUCTION COMPLETED.

⑥ STATION FOR

PROJECT PLANNING SCHEDULE



- MITTED. ③ C.O.S.C.B. AND ONE S.C.B. COMPLETED- INCLUDING ALL NORMAL POWER AND AIR CONDITIONING. ⑤ OPERATIONAL DATE OF ONE S.C.B., AND PORTION OF C.O.S.C.B. REQUIRED TO PROVE-OUT MIDAS SYSTEM.
- S.C.B. AND ④ ALL CONSTRUCTION COMPLETED. ⑥ STATION FULLY OPERATIONAL. AREAS FIN- RARY

SECTION 8
LIST OF DRAWINGS

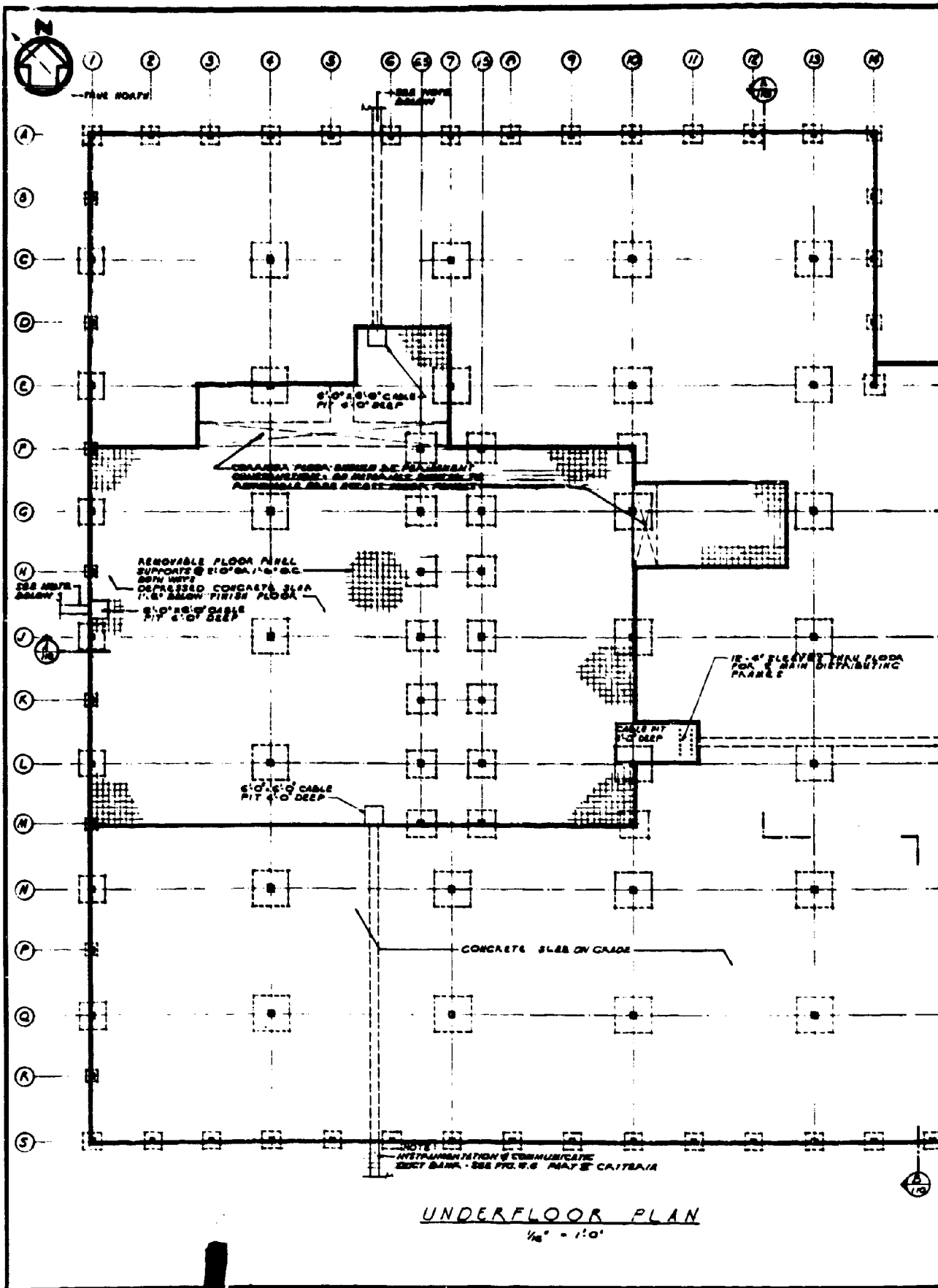
The drawings included with this Basis for Design are listed below, except Drawing No. 1868-1/101 which is included in Part I of these criteria. The drawings indicate the functional arrangement of rooms and equipment within each building, and were prepared for use in the preparation of the preliminary design documents.

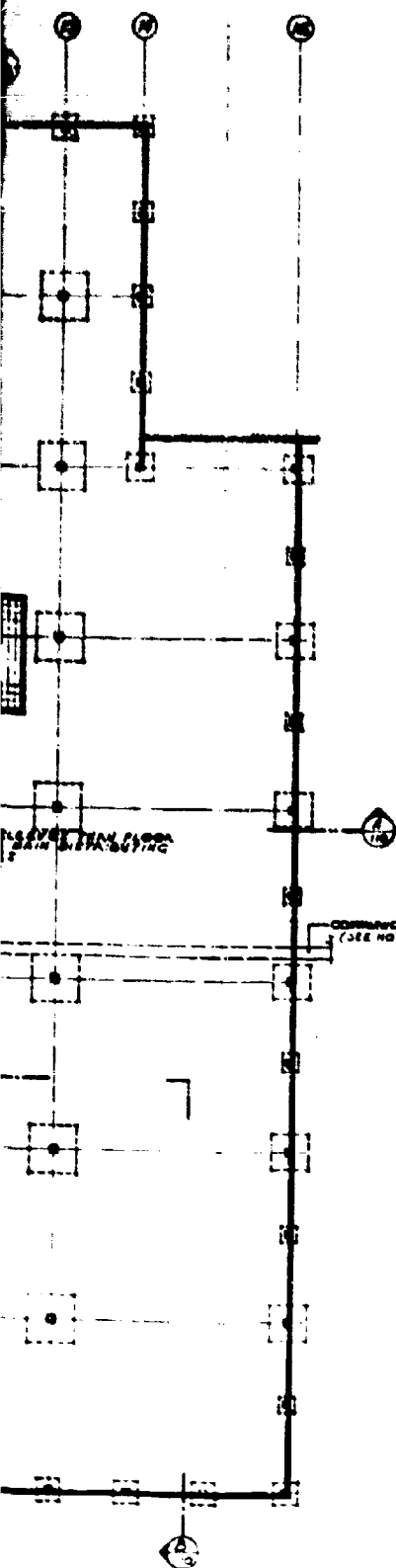
<u>Sheet No.</u>	<u>Drawing No.</u>	<u>Description</u>
1 of 15	1868-1/101	Site Plan and Vicinity Map
2 of 15	1868-1/102	Central Operations and System Control Building - Under-Floor Plan
3 of 15	1868-1/103	Central Operations and System Control Building - Floor Plan and Mezzanine Plan
4 of 15	1868-1/104	Central Operations and System Control Building - Floor Plan - Part "A"
5 of 15	1868-1/105	Central Operations and System Control Building - Floor Plan - Part "B"
6 of 15	1868-1/106	Central Operations and System Control Building - Floor Plan - Part "C"
7 of 15	1868-1/107	Central Operations and System Control Building - Floor Plan - Part "D"
8 of 15	1868-1/108	Central Operations and System Control Building - Floor Plan - Part "E" and Part "G"
9 of 15	1868-1/109	Central Operations and System Control Building - Floor Plan - Part "F" Central Control - Expansion Capability
10 of 15	1868-1/110	Central Operations and System Control Building - Building Sections

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<u>Sheet No.</u>	<u>Drawing No.</u>	<u>Description</u>
11 of 15	1868-1/111	Central Operations and System Control Building - Perspective and Technical Collateral Equipment List
12 of 15	1868-1/112	Satellite Communications Building Underfloor and Floor Plans
13 of 15	1868-1/113	Satellite Communications Building Sections, Perspective and Technical Collateral Equipment List
14 of 15	1868-1/114	Heating, Ventilating and Air Conditioning Flow and Control Diagram Technical Areas - Air-Conditioning Systems
15 of 15	1868-1/115	Electrical Single-Line Diagram

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LEGEND

- CONCRETE
- CONCRETE FLOOR
- WATER MAIN PLUMBING
- SEWER MAIN PLUMBING
- LIGHTING & RECEPTACLE PANEL
- TELEPHONE CLOSET
- TELEPHONE PANEL

ABBREVIATIONS

- DRD DRAINAGE WATER DISPENSE
- LEV. LEVEL
- R.C. REAR CLOSET
- S.S. SINK
- L.P.S. LIGHT FIXTURE
- T.E.E. TECHNICAL EQUIPMENT
- N.I.C. NOT IN CONTACT
- C.O. CLOSET ONLY
- U.R. URINAL
- O.C. ON CENTER
- MISCL. MISCELLANEOUS
- G.P.M. GALLONS PER MINUTE
- C.P.D. CUBIC FEET PER DAY
- M.E.E. MECHANICAL EQUIPMENT
- T.E.L. TELEPHONE
- C.A.N.N.E.T. CANNET
- C.O.N.T. CONTINUATION
- R.M. ROOM
- G.A. QUALITY ASSURANCE
- T.Y.P. TYPICAL
- S.D.P. STANDARD PRACTICE

FURNITURE INDICATIONS

- CHAIR
- FILE
- SEAL & CHAIR
- SEAL, CHAIR & FILE
- WRITING TABLE & STOOL
- CONFERENCE TABLE & CHAIRS

NOTES

1. ALL EQUIPMENT AND FURNITURE NUMBERS OR CALLED OFF, EXCEPT MECHANICAL AND ELECTRICAL EQUIPMENT WILL BE MAINTAINED AND INSTALLED INDEPENDENT OF THIS CONTRACT.
2. ALL UTILITIES SHALL ENTER BELOW THE CONCRETE FLOOR SLABS. INSTRUMENTATION & COMMUNICATION DUCT BANKS WILL ENTER THE BUILDING THRU THE FOUNDATION WALLS AND INTO A PIT BELOW THE OPERATED SLABS IN THE REMOVABLE FLOOR ACCESS FLOOR PANEL AREA.

GRAPHIC SCALE

0 10 20 30 40 50 FEET

UTILITY REQUIREMENTS

ELECTRICAL (DEMAND LOAD)	KVA
T.E.E. POWER	181.80
LIGHTING	185.25
RECEPTACLES & SPARES	70.00
RECEPTACLES & MISCL.	22.25
KITCHEN EQUIPMENT	27.90
POWER	160.90
TOTAL DEMAND LOAD	754.10

WATER (GPM)	
HOT	30
COLD	10
TOTAL	40
WATER (CPD)	
PERSONNEL	20,000
INDUSTRIAL	20,000
SEWER (CPD)	
PERSONNEL	20,000
INDUSTRIAL	20,000
GAS - NON INHALEABLE	FOOD CPD

HEATING REQUIREMENTS

OUTSIDE DESIGN TEMPERATURES	-10°F
MEAN	4.000

HEATING PLANT

HEATING WATER CAPACITY (GPM)	600
GAS - INHALEABLE (CPD)	100,000
STAND-BY FUEL	LIGHT OIL

AIR CONDITIONING REQUIREMENTS

THE FOLLOWING REQUIREMENTS ARE BASED ON SUMMER OUTDOOR CONDITIONS OF 75° DAY BULB AND 75° WET BULB

TONS OF REFRIGERATION 500

AREA ANALYSIS (SQ. FT.)

	FIRST FLOOR	AREA FLOOR	ROOF	TOTAL
TECHNICAL	23,792	1,902		25,694
TECHNICAL SUPPORT	26,344			26,344
ADMINISTRATION	14,196	998		15,194
FACILITY SUPPORT	10,000		9348	19,348
CIRCULATORY	13,697	84		13,781

CAPACITY

PRIME SHIFT PERSONNEL	379
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AREA FOR PROGRAMMING

BASIC GROSS AREA 112,780 SQ. FT.

LOCKHEED MISSILES AND SPACE DIVISION

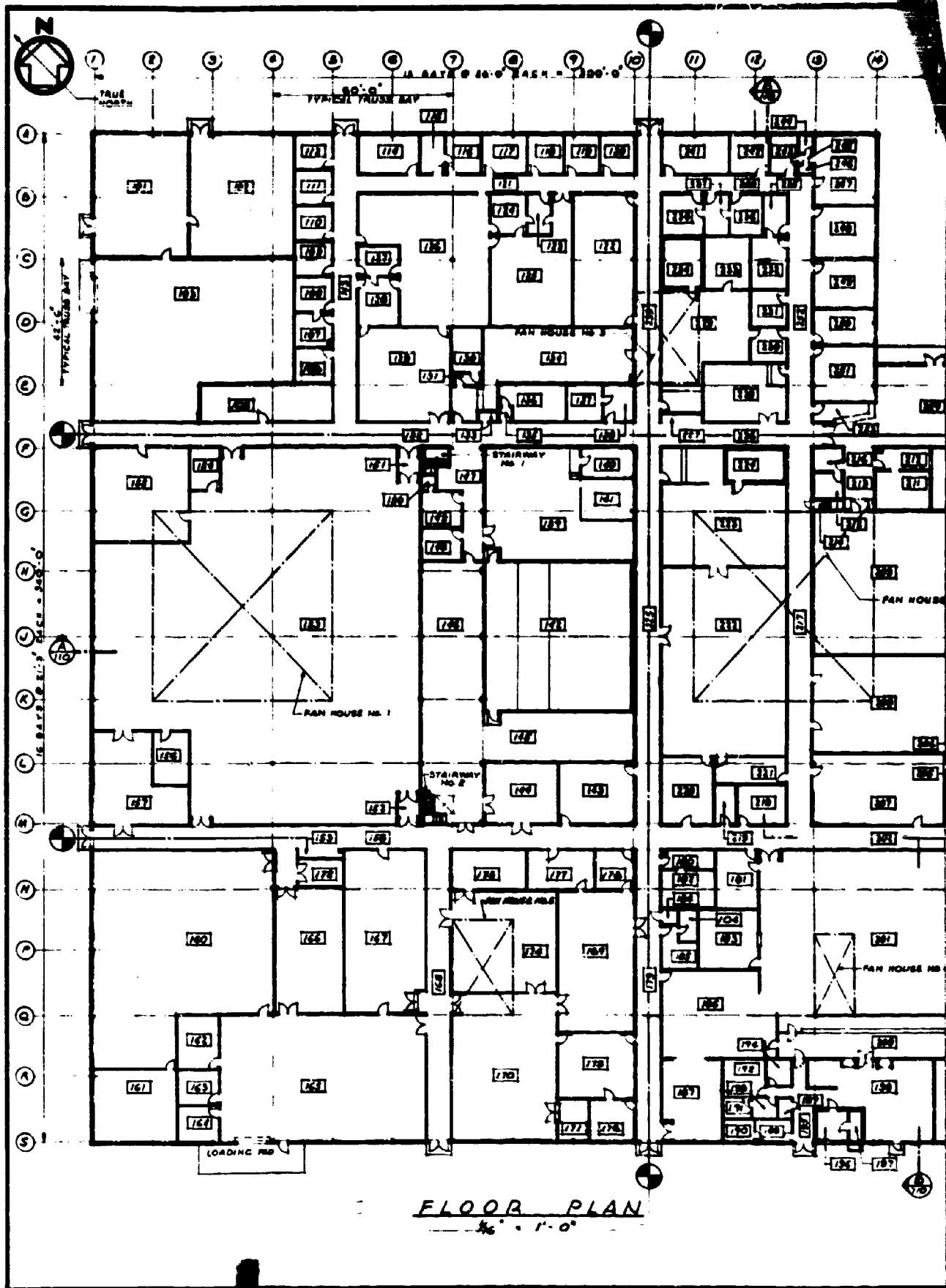
LOCKHEED AIRCRAFT CORPORATION
THE RALPH M. PARSONS COMPANY
AND OTHERS

FACILITIES CRITERIA
MISSILE TRACKING AND CONTROL CENTER
CENTRAL OPERATIONS AND SYSTEM CONTROL BUILDING
UNDER FLOOR PLAN

1968-1/102

SCALE 1/16" = 1' - 0"

DATE MARCH 1, 1961



ROOM NAME LEGEND

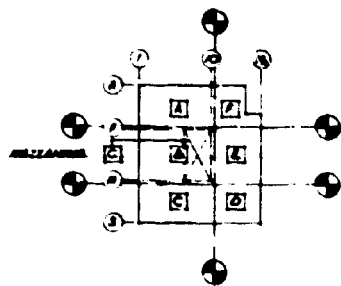
- 101 ADJUTANT ROOM
- 102 ELECTRICAL EQUIPMENT ROOM
- 103 RECEPTION & PAN ROOM
- 104 FEMALE TOILET ROOM
- 105 WASTEWATER ANALYSIS ROOM
- 106 STORAGE ROOM
- 107 TRACKING CONTROL MANAGER'S OFFICE
- 108 TRACKING CONTROL OFFICE
- 109 UNASSIGNED OFFICE
- 110 UNASSIGNED OFFICE
- 111 UNASSIGNED OFFICE
- 112 CORRIDOR
- 113 CONFERENCE ROOM
- 114 TRACKING OFFICE (S.A. MANAGER)
- 115 QUALITY ASSURANCE MANAGER'S OFFICE
- 116 CONFERENCE ROOM
- 117 U.S. MANAGER'S OFFICE
- 118 COMMUNICATIONS SYSTEM MANAGER'S OFFICE
- 119 DATA SYSTEM MANAGER'S OFFICE

- 120 CORRIDOR
- 121 STENOGRAPHIC RECEPTION
- 122 STENOGRAPHIC OFFICE (STENOGRAPH)
- 123 TECHNICAL OPERATIONS DIRECTOR'S OFFICE
- 124 TECHNICAL OPERATIONS DIRECTOR'S STAFF
- 125 SECRETARY'S OFFICE (TRACKING CONTROL)
- 126 TRACKING CONTROL DIRECTOR'S OFFICE
- 127 TRACKING CONTROL ROOM
- 128 BARR ROOM
- 129 LIFT-LOCK
- 130 CORRIDOR
- 131 JANITOR'S CLOSET
- 132 PUBLICATIONS AND REPRODUCTION ROOM
- 133 VESTIBULE
- 134 MALE TOILET ROOM
- 135 FEMALE TOILET ROOM
- 136 LOUNGE
- 137 OPERATIONS PLANNING ROOM
- 138 PRODUCTION ROOM
- 139 VIEWING AREA
- 140 CENTRAL CONTROL ROOM
- 141 CONFERENCE ROOM
- 142 MAINTENANCE AND STORAGE ROOM
- 143 EQUIPMENT ROOM OFFICE
- 144 EQUIPMENT ROOM
- 145 CORRIDOR
- 146 CENTRAL CONTROL OFFICE
- 147 READY ROOM
- 148 TOILET ROOM
- 149 VESTIBULE
- 150 VESTIBULE
- 151 DATA PROCESSING AND ANALYSIS ROOM
- 152 PROGRAMMER MANAGER'S OFFICE
- 153 PROGRAMMING & AUTOMATIC CONTROL ROOM
- 154 TAPE HANDLING AND STORAGE ROOM
- 155 MAINTENANCE AND STORAGE ROOM
- 156 CORRIDOR
- 157 VENDING MACHINE ALCOVE
- 158 STORAGE AREA
- 159 CONTROLLED STORAGE AREA
- 160 SUPPLY COMMUNICATIONS OFFICE
- 161 SUPPLY RECORDS OFFICE
- 162 SUPERVISOR'S OFFICE
- 163 BARRING & RECEIVING ROOM WITH HOLDING AREA
- 164 QUALITY ASSURANCE (REVIEW) INSPECTION ROOM
- 165 ELECTRONICS PARTS STORE ROOM
- 166 CORRIDOR
- 167 QUALITY ASSURANCE MAINTENANCE TEST ROOM
- 168 CENTRAL MAINTENANCE ROOM
- 169 TOOL CABS
- 170 TAPES STORAGE ROOM
- 171 STANDARDS LABORATORY
- 172 CALIBRATION LABORATORY
- 173 MAINTENANCE ANALYSIS ROOM
- 174 RELIABILITY OFFICE
- 175 QUALITY ASSURANCE MATERIALS REVIEW BOARD RM
- 176 QUALITY ASSURANCE OFFICE
- 177 CORRIDOR
- 178 MALE WASH ROOM
- 179 STORAGE ROOM
- 180 MALE TOILET ROOM
- 181 SCULLERY
- 182 JANITOR'S CLOSET
- 183 LOUNGE
- 184 V.I.P. DINING AREA (BAY ROOM)
- 185 V.I.P. PRIVATE DINING ALCOVE
- 186 FEMALE LOCKER ROOM
- 187 JANITOR'S CLOSET
- 188 FEMALE TOILET ROOM
- 189 MALE TOILET ROOM
- 190 STORAGE ROOM

- 191 MALE LOCKER ROOM
- 192 PHYSICIAN'S OFFICE
- 193 HALL
- 194 HALL & RECEPTION
- 195 PASSAGE
- 196 KITCHEN
- 197 ELECTRICAL EQUIPMENT ROOM
- 198 MEETING AREA
- 199 CAFETERIA
- 200 CORRIDOR
- 201 FIRST AID ROOM
- 202 TREATMENT ROOM
- 203 MEDICAL SUPPLY ROOM
- 204 TOILET ROOM
- 205 SYSTEM ANALYSIS ROOM
- 206 SYSTEM CONTROL ROOM (IDENTIFICATION AND BRIEFING ROOM)
- 207 SECURITY OFFICE
- 208 MALE TOILET ROOM
- 209 MALE WASH ROOM
- 210 CORRIDOR
- 211 ROOM ACCESS CLOSET
- 212 FEMALE TOILET ROOM
- 213 LOUNGE
- 214 CORRIDOR
- 215 MAINTENANCE SERVICES OFFICE
- 216 SUPPLY ROOM
- 217 COMMUNICATIONS OFFICE
- 218 SWITCHBOARD ROOM
- 219 COMMUNICATIONS EQUIPMENT ROOM
- 220 MESSAGE CENTER ROOM
- 221 CRYPTO ROOM
- 222 CORRIDOR
- 223 CORRIDOR
- 224 VENDING MACHINE ALCOVE
- 225 MAIL ROOM
- 226 DOCUMENT CONTROL ROOM
- 227 ADMINISTRATIVE SERVICES OFFICE
- 228 PUBLIC RELATIONS OFFICE
- 229 AIR FORCE LIAISON OFFICE
- 230 BLUE PRINT CAB
- 231 CLASSIFIED MAIL
- 232 SECRETARY'S OFFICE (A.F. LIAISON)
- 233 FACILITIES SUPPORT OFFICE
- 234 SECRETARY'S OFFICE (SUPPORT)
- 235 STATION TECHNICAL SUPPORT DIRECTOR'S OFFICE
- 236 CORRIDOR
- 237 CORRIDOR
- 238 CONFERENCE ROOM
- 239 ASSISTANT STATION MANAGER'S OFFICE
- 240 SECRETARY'S OFFICE (STATION MANAGER)
- 241 TOILET ROOM
- 242 HALL
- 243 CLOSET
- 244 STATION MANAGER'S OFFICE
- 245 ADMINISTRATIVE STAFF OFFICE
- 246 ENGINEERING STAFF OFFICE
- 247 INDUSTRIAL RELATIONS OFFICE
- 248 PERSONNEL RELATIONS OFFICE
- 249 CORRIDOR
- 250 GUARD ALCOVE
- 251 LOBBY
- 252 CONFERENCE ROOM (MEETING)
- 253 OBSERVATION ROOM (MEETING)
- 254 PROJECTION ROOM (MEETING)

MEZZANINE FLOOR PLAN

1/2" = 1'-0"



KEY PLAN
NO SCALE

GRAPHIC SCALE
0 1 2
FOOT

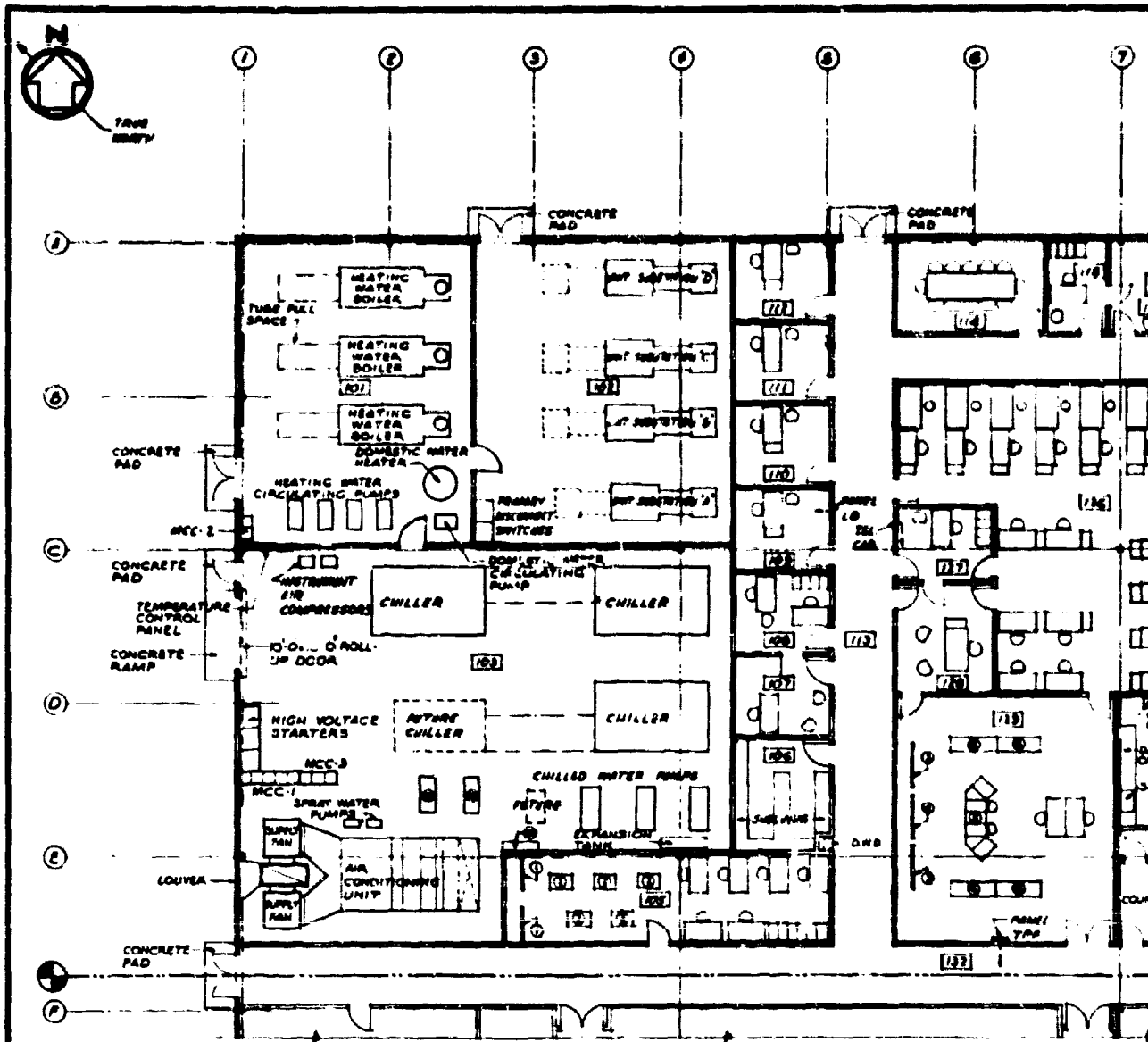
LOCKHEED MISSILES AND SPACE DIVISION

LOCKHEED AIRCRAFT CORPORATION
THE RALPH M. PARSONS COMPANY
LOCKHEED BUILDING

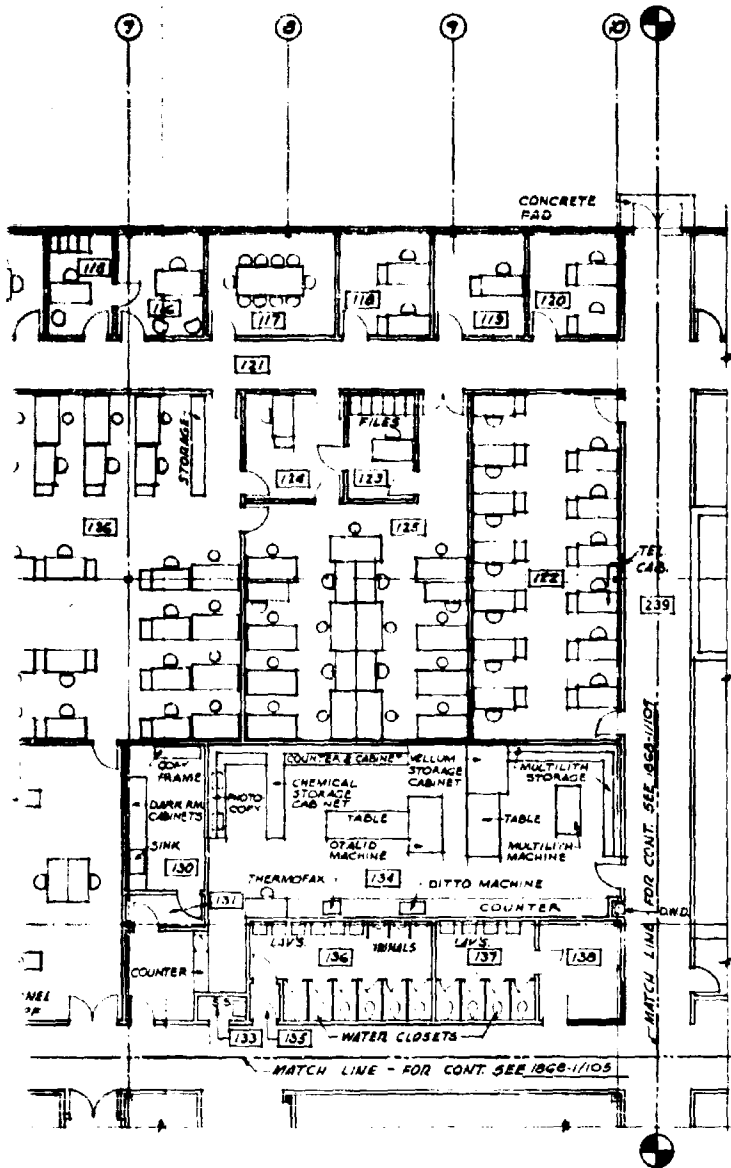
FACILITIES CENTER
MISSILE TRACKING AND CONTROL CENTER
CENTRAL OPERATIONS AND SYSTEM CONTROL BUILDING
FLOOR PLAN AND MEZZANINE PLAN

1868-1/103

DATE 1/16/61
DRAWN BY [Signature]
CHECKED BY [Signature]
DATE MARCH 1, 1961



FLOOR PLAN - PART
6' . 1' . 0'



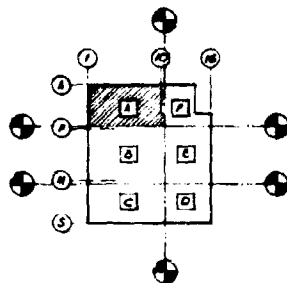
ROOM NAME LEGEND

- 101 BOILER ROOM
- 102 ELECTRICAL EQUIPMENT ROOM
- 103 REFRIGERATION & FAN ROOM
- 104 WEATHER ANALYSIS ROOM
- 105 STORAGE ROOM
- 107 TRACKING CONTROL MANAGER'S OFFICE
- 108 TRACKING CONTROL OFFICE
- 109 UNASSIGNED OFFICE
- 110 UNASSIGNED OFFICE
- 111 UNASSIGNED OFFICE
- 112 UNASSIGNED OFFICE
- 113 CORRIDOR
- 114 CONFERENCE ROOM
- 115 SECRETARY'S OFFICE (O.A. MANAGER)
- 116 QUALITY ASSURANCE MANAGER'S OFFICE
- 117 CONFERENCE ROOM
- 118 UNF MANAGER'S OFFICE
- 119 COMMUNICATIONS SYSTEM MANAGER'S OFFICE
- 120 DATA SYSTEM MANAGER'S OFFICE
- 121 CORRIDOR
- 122 STENOGRAPHIC SERVICES
- 123 SECRETARY'S OFFICE (TECH. OPER'S. DIRECTOR)
- 124 TECHNICAL OPERATIONS DIRECTOR'S OFFICE
- 125 TECHNICAL OPERATIONS DRAWING MAINTENANCE STAFF
- 126 TECHNICAL OPERATIONS TECHNICAL REPRESENTATIVES
- 127 SECRETARY'S OFFICE (TRACKING CONTROL)
- 128 TRACKING CONTROL DIRECTOR'S OFFICE
- 129 TRACKING CONTROL ROOM
- 130 DARK ROOM
- 131 LIGHT-LOCK
- 132 CORRIDOR
- 133 JANITOR'S CLOSET
- 134 PUBLICATIONS & REPRODUCTION ROOM
- 135 VESTIBULE
- 136 MALE TOILET ROOM
- 137 FEMALE TOILET ROOM
- 138 LOUNGE

PART 'A'

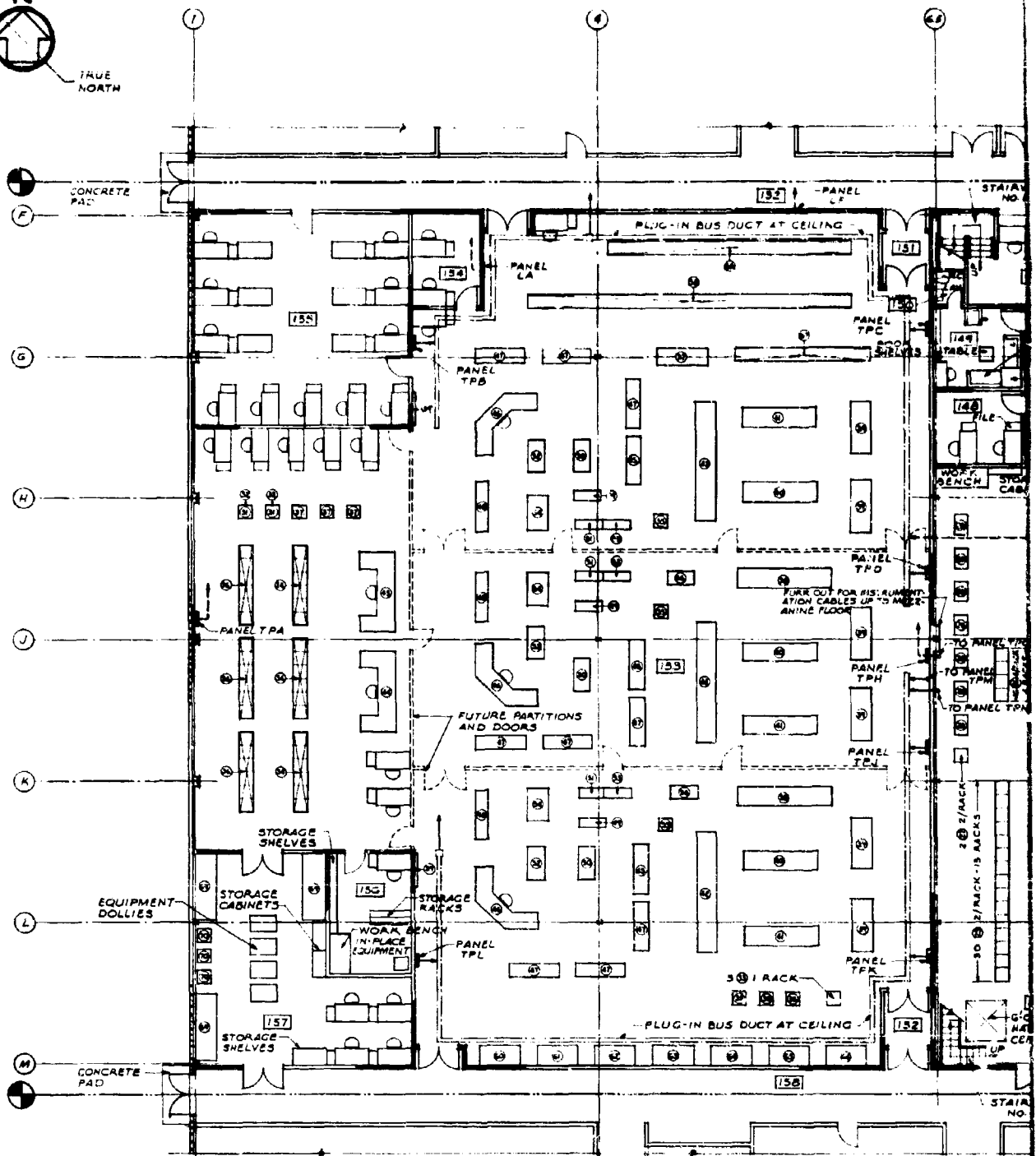
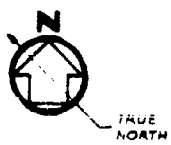
NOTE:
SEE DRAWING NO 1868-1/102
FOR NOTES AND LEGEND

GRAPHIC SCALE
INCHES



KEY PLAN
NO SCALE

<p>LOCKHEED MISSILES AND SPACE DIVISION LOCKHEED AIRCRAFT CORPORATION THE RALPH M. PARSONS COMPANY ARCHITECT ENGINEERS LOS ANGELES, CALIFORNIA</p>	<p>DATE: _____ APPROVAL: _____</p>
<p>FACILITIES CRITERIA MIDAS TRACKING AND CONTROL CENTER CENTRAL OPERATIONS AND SYSTEM CONTROL BUILDING FLOOR PLAN - PART 'A'</p>	
<p>DESIGNED BY: <i>R.M. Powell</i> DRAWN BY: <i>R.M. Powell</i></p>	<p>1868-1/104 SCALE 1/8" = 1'-0" SHEET 4 OF 15 DATE MARCH 1, 1961</p>

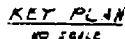


FLOOR PLAN - PART B
1/8" = 1'-0"

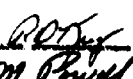


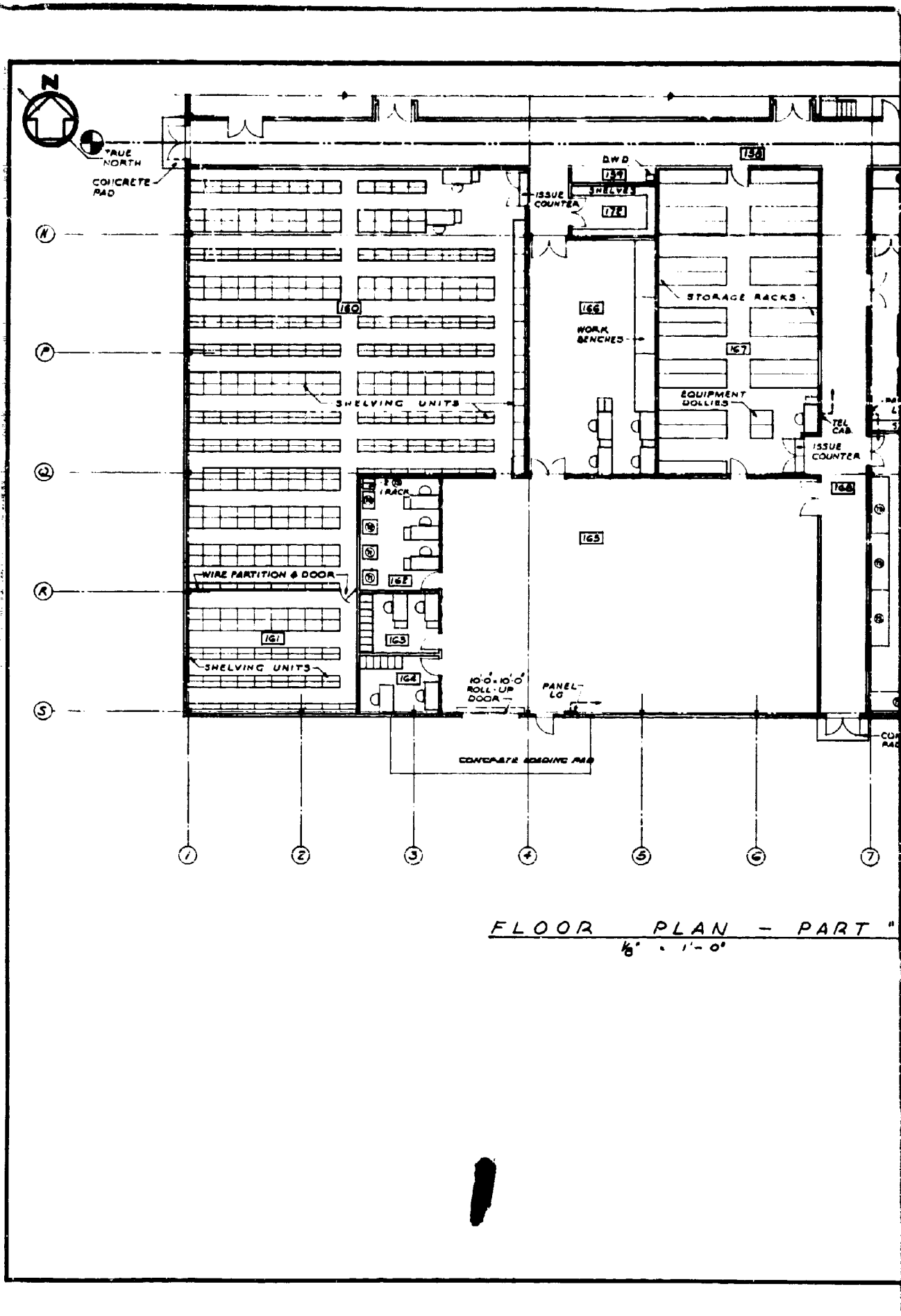
GRAPHIC SCALE

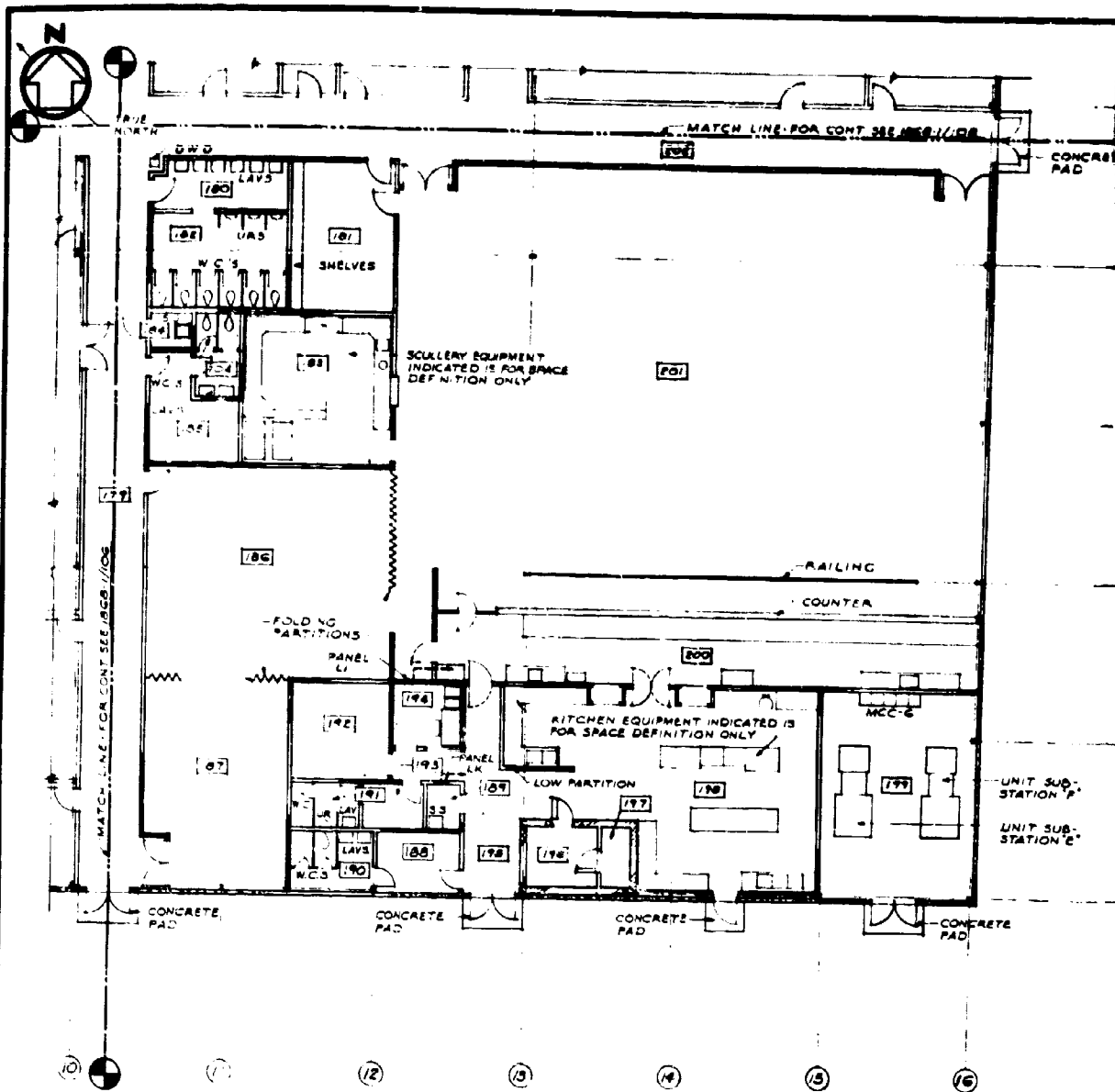
INCHES 0 1/4 1 2 3



137	OPERATIONS PLANNING ROOM
140	PROJECTION BOOTH
141	VIEWING AREA
142	CENTRAL CONTROL ROOM
143	CONFERENCE ROOM
144	MAINTENANCE AND STORAGE ROOM
145	EQUIPMENT ROOM OFFICE
146	EQUIPMENT ROOM
147	CORRIDOR
148	CENTRAL CONTROL OFFICE
149	READY ROOM
150	TOILET ROOM
151	VESTIBULE
152	VESTIBULE
153	DATA PROCESSING AND ANALYSIS ROOM
154	PROGRAMMER MANAGER'S OFFICE
155	PROGRAMMING AND AUTOMATIC CONTROLS ROOM
156	TAPE HANDLING AND STORAGE ROOM
157	MAINTENANCE AND STORAGE ROOM
158	CORRIDOR
225	CORRIDOR

PLANS	REVISIONS	DESCRIPTION	DATE	APPROVAL
<h1>LOCKHEED MISSILES AND SPACE DIVISION</h1> <p>LOCKHEED AIRCRAFT CORPORATION</p> <p>THE RALPH M. PARSONS COMPANY</p> <p>LOS ANGELES, CALIFORNIA</p>				
<p>FACILITIES CRITERIA</p> <p>MIAS TRACKING AND CONTROL CENTER</p> <p>CENTRAL OPERATIONS AND SYSTEM CONTROL BUILDING</p> <p>FLOOR PLAN - PART "B"</p>				
DRAWING 240			1868-1/105	SCALE 1/8" = 1'-0" DATE MARCH 1, 1961
RALPH M. PARSONS MANAGER COMMUNICATIONS AND CONTROL		SHEET 5 OF 15		





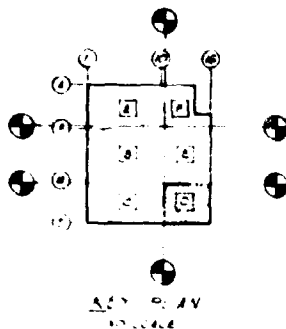
FLOOR PLAN - PART 'D'

1/8" = 1'-0"

ROOM NAME LEGEND

177	CORRIDOR
178	MALE WASH ROOM
179	STORAGE ROOM
180	MALE TOILET ROOM
181	SCULLERY
182	JANITOR'S CLOSET
183	FEMALE TOILET ROOM
184	LOUNGE
185	V.I.P. DINING AREA (DAY ROOM)
186	V.I.P. PRIVATE DINING ALCOVE
187	FEMALE LOCKER ROOM
188	JANITOR'S CLOSET
189	FEMALE TOILET ROOM
190	MALE TOILET ROOM
191	STORAGE ROOM
192	MALE LOCKER ROOM
193	DIRECTOR'S OFFICE
194	HALL
195	WALK-IN REFRIGERATOR
196	PREEZER
197	KITCHEN
198	ELECTRICAL EQUIPMENT ROOM
199	SEATING AREA
200	CAFETERIA
201	CORRIDOR

NOTE
SEE DRAWING NO. 1868-1/107
FOR NOTES AND LEGEND



GRAPHIC SCALE
1" = 10'

LOCKHEED MISSILES AND SPACE DIVISION

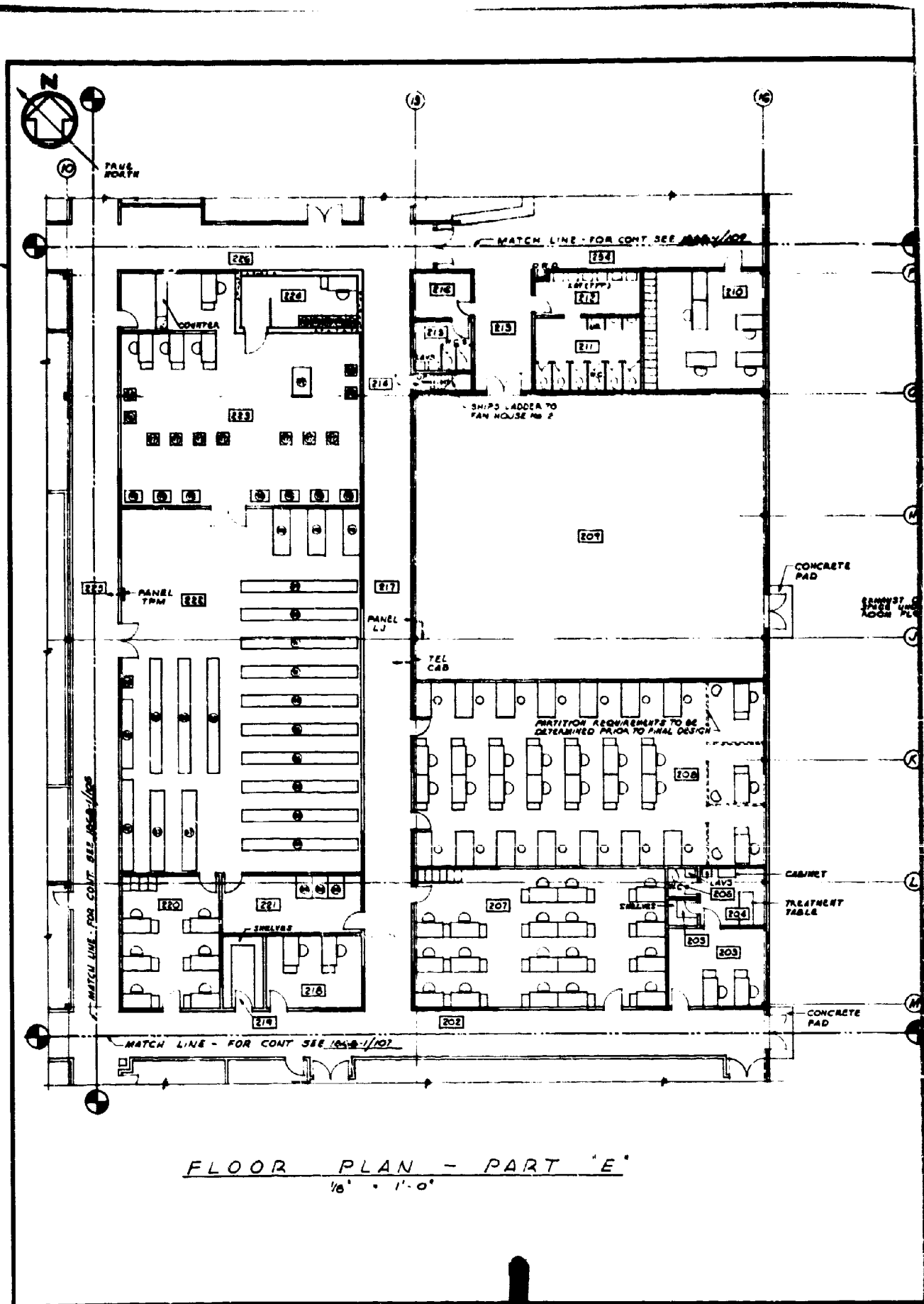
LOCKHEED AIRCRAFT CORPORATION
THE RALPH M. PARSONS COMPANY
MICHAEL BARRON
LOS ANGELES, CALIFORNIA

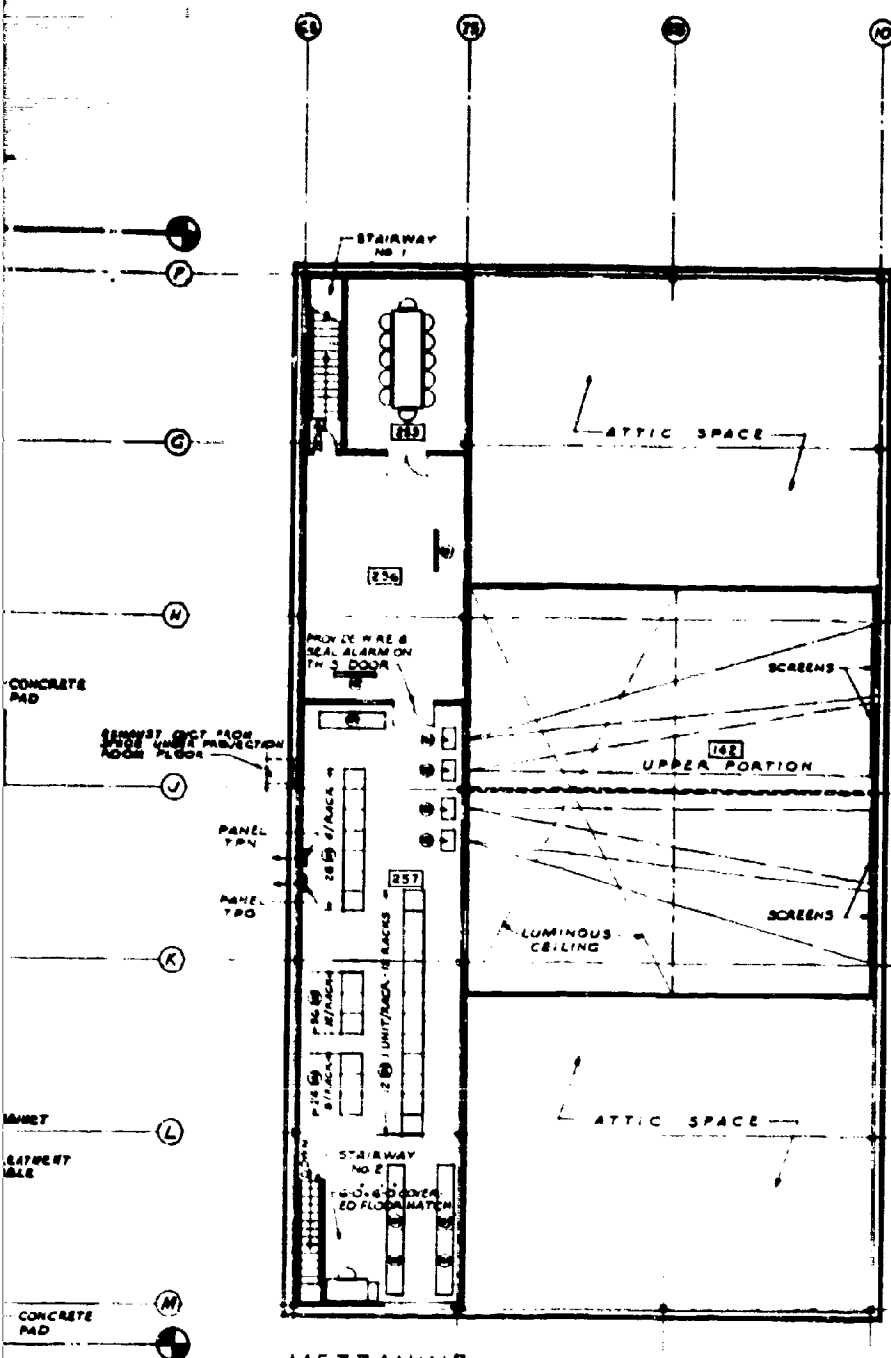
FACILITIES CRITERIA
MIDAS TRACKING AND CONTROL CENTER
CENTRAL OPERATIONS AND SYSTEM CONTROL BUILDING
FLOOR PLAN - PART "D"

1868-1/107

APPROVED
R.M. Parsons
MANAGER, SYSTEMS DIVISION

SCALE 1/8" = 1'-0"
DATE MARCH 1, 1961

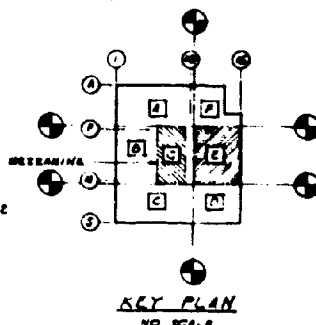




MEZZANINE
FLOOR PLAN
PART 'G'
18' x 1'-0"

NOTE
SEE DRAWING NO 1868-1, OR
FOR NOTES AND LEGEND

GRAPHIC SCALE
INCHES 0 1 2



KEY PLAN
NO SCALE

ROOM NAME LEGEND

- 201 CORRIDOR
- 202 FIRST AID ROOM
- 203 TREATMENT ROOM
- 204 MEDICAL SUPPLY ROOM
- 205 TOILET ROOM
- 206 SYSTEM ANALYSIS ROOM
- 207 SYSTEM CONTROL TECHNICAL REPRESENTATIVES ROOM
- 208 BRIEFING ROOM
- 209 SECURITY OFFICE
- 210 MALE TOILET ROOM
- 211 MALE WASH ROOM
- 212 CORRIDOR
- 213 ROOF ACCESS CLOSET
- 214 FEMALE TOILET ROOM
- 215 LOUNGE
- 216 CORRIDOR
- 217 MAINTENANCE SERVICES OFFICE
- 218 SUPPLY ROOM
- 219 COMMUNICATIONS OFFICE
- 220 SWITCHBOARD ROOM
- 221 COMMUNICATIONS EQUIPMENT ROOM
- 222 MESSAGE CENTER ROOM
- 223 CRYPTO ROOM
- 224 CORRIDOR
- 225 CORRIDOR
- 226 LOBBY
- 227 CONFERENCE ROOM
- 228 OBSERVATION ROOM
- 229 PROJECTION ROOM

LOCKHEED MISSILES AND SPACE DIVISION

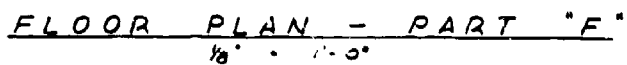
LOCKHEED AIRCRAFT CORPORATION
THE RALPH M. PARSONS COMPANY
LOS ANGELES, CALIFORNIA

FACILITIES CRITERIA
MBS TRACKING AND CONTROL CENTER
CENTRAL OPERATIONS AND SYSTEM CONTROL BUILDING
FLOOR PLAN - PART 'G' AND PART 'H'

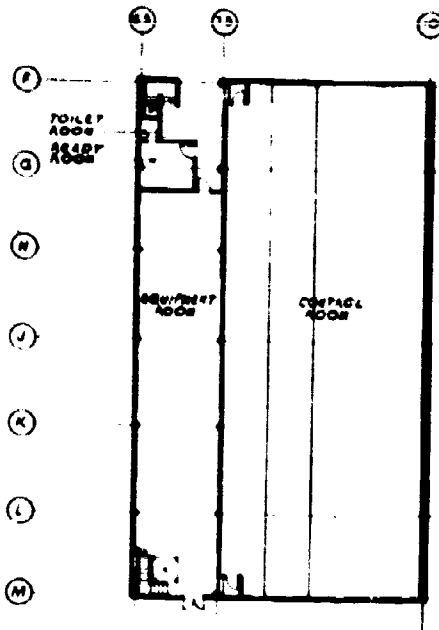
Ralph M. Parsons
Ralph M. Parsons

1868-1/108

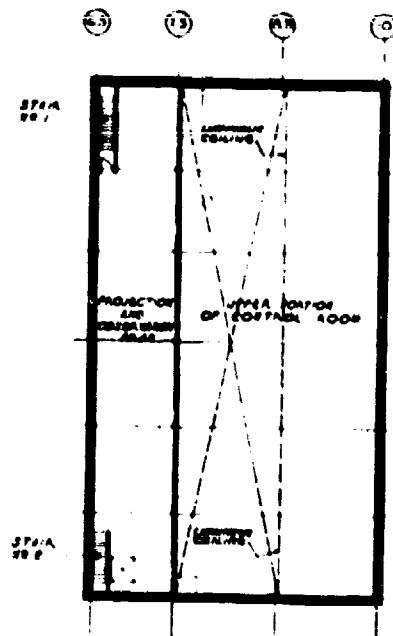
SCALE 1/8" = 1'-0"
DATE MARCH 1, 1961 SHEET 5 OF 15



100



FLOOR PLAN
1/8" = 1'-0"



MEZZANINE FLOOR PLAN
1/8" = 1'-0"

CENTRAL CONTROL - EXPANSION CAPABILITY

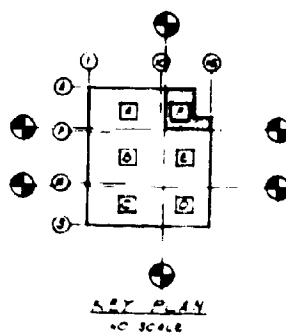
ROOM NAME LEGEND

- 226 CORRIDOR
- 227 VENDING MACHINE ALCOVE
- 228 MAIL ROOM
- 229 DOCUMENT CONTROL ROOM
- 230 ADMINISTRATIVE SERVICES OFFICE
- 231 PUBLIC RELATIONS OFFICE
- 232 A-4 FORCE LIAISON OFFICE
- 233 BLUE PRINT CRB
- 234 CLASSIFIED VAULT
- 235 SECRETARY'S OFFICE (A-4 LIAISON)
- 236 FACILITIES SUPPORT OFFICE
- 237 SECRETARY'S OFFICE (SUPPORT)
- 238 SYSTEM TECHNICAL SUPPORT DIRECTOR'S OFFICE
- 239 CORRIDOR
- 240 CORRIDOR

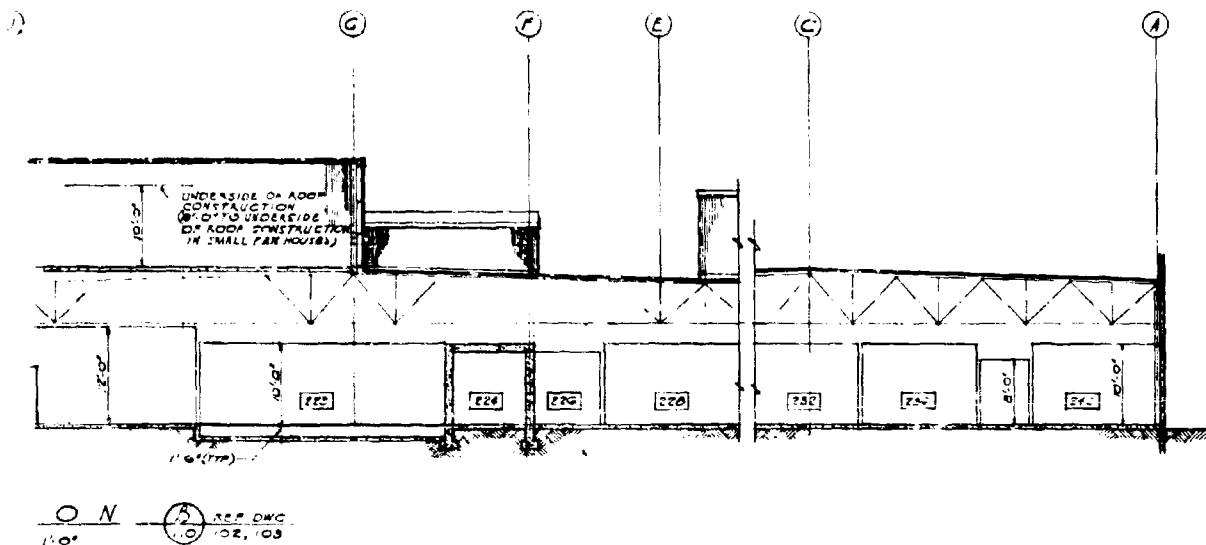
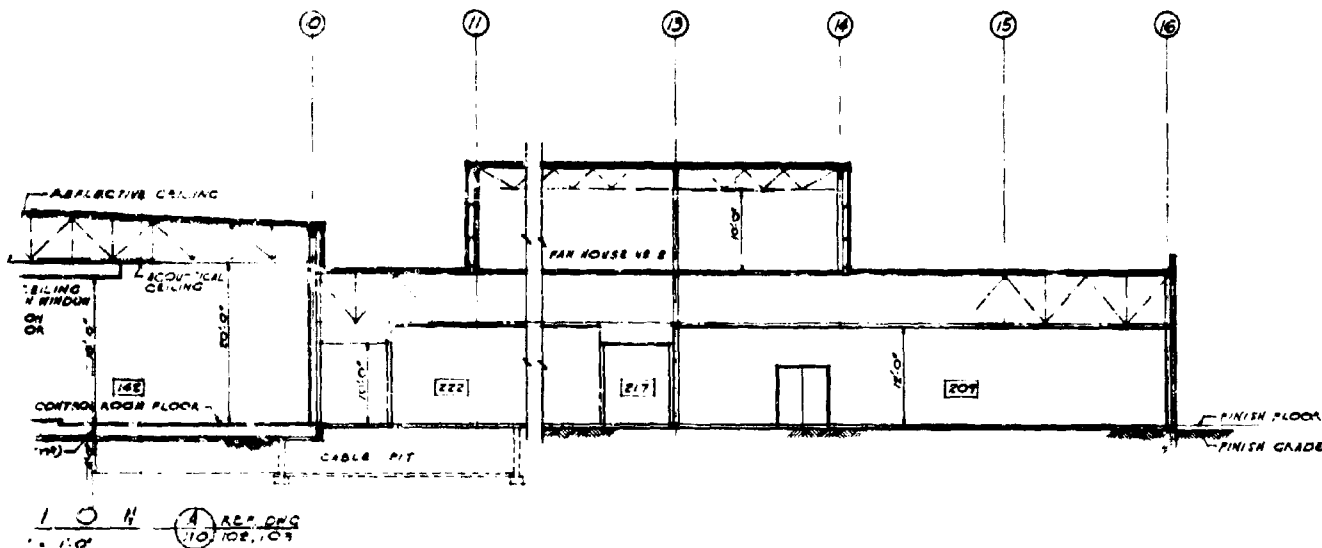
- 241 CONFERENCE ROOM
- 242 ASSISTANT STATION MANAGER'S OFFICE
- 243 SECRETARY'S OFFICE (STATION MANAGER)
- 244 TOILET ROOM
- 245 HALL
- 246 CLOSET
- 247 STATION MANAGER'S OFFICE
- 248 ADMINISTRATIVE STAFF OFFICE
- 249 ENGINEERING STAFF OFFICE
- 250 INDUSTRIAL RELATIONS OFFICE
- 251 PERSONNEL RELATIONS OFFICE
- 252 CORRIDOR
- 253 GUARD ALCOVE
- 254 LOBBY

NOTE
SEE DRAWING 060-1102
FOR NOTES AND SCENE

GRAPHIC SCALE
INCHES 0 1 2 3 4 5 6 7 8 9 10

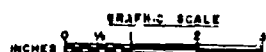


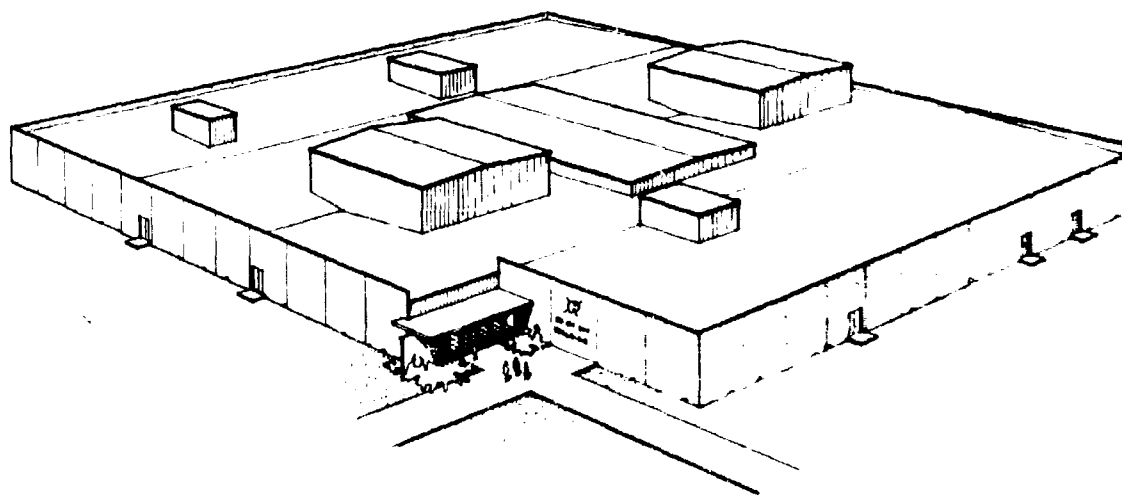
LOCKHEED MISSILES AND SPACE DIVISION	
LOCKHEED AIRCRAFT CORPORATION THE RALPH M. PARSONS COMPANY 4000 FIVE CIRCLE DRIVE FREMONT, CALIFORNIA 94538	
FACILITIES CRITERIA MIDAS TRACKING AND CONTROL CENTER CENTRAL OPERATIONS AND SYSTEM CONTROL BUILDING FLOOR PLAN - PART "F" CENTRAL CONTROL - EXPANSION CAPABILITY	
1868-1/109	SCALE AS NOTED SHEET 0 OF 15 DATE MARCH 1, 1981



SYMBOL	DIVISIONS	DESCRIPTION	DATE	APPROVAL
LOCKHEED MISSILES AND SPACE DIVISION				
LOCKHEED AIRCRAFT CORPORATION				
THE RALPH M. PARSONS COMPANY				
ARCHITECT ENGINEERS LOS ANGELES, CALIFORNIA				
FACILITIES CRITERIA MIDAS TRACKING AND CONTROL CENTER CENTRAL OPERATIONS AND SYSTEM CONTROL BUILDING BUILDING SECTIONS				
DESIGNED BY MICHAEL E. HARRIS		1868-1/110		
CHECKED BY R. M. PARSONS		SCALE 1/8" = 1'-0"		
MANAGER, COMMUNICATIONS AND CONTROL		SHEET 10 OF 15 DATE MARCH 1, 1961		

2






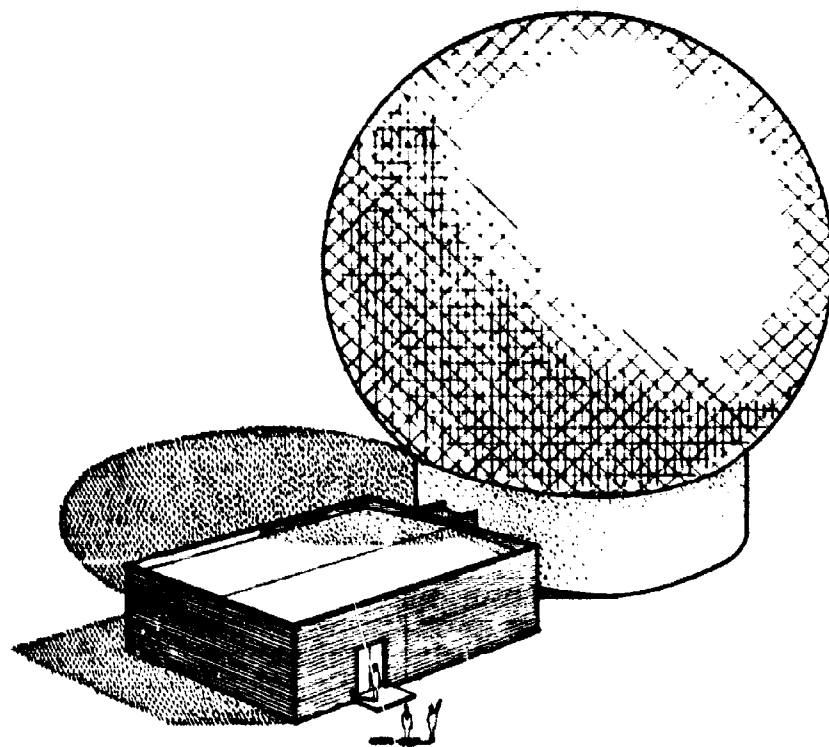
P E R S P E C T I V E

TECHNICAL COLLATERAL EQUIPMENT (N.I.C.)		
ITEM NO.	DESCRIPTION	
1001	STATUS BOARD	
1002	FACSIMILE RECEIVING MACHINE	
1003	STATUS BOARD	
1004	STATUS BOARD	
1005	TRACKING RECORDER & TRANSMITTING CONTROL CONSOLE	
1006	TECHNICAL EQUIPMENT TO BE DEFINED	
1007	SIMULATORS	
1008	SLIDE REPRODUCERS	
1009	TRACING BOARD	
1010	STATUS BOARD	
1011	TV MONITORS	
1012	ALPHA-NUMERIC DISPLAY	
1013	PROJECTION SYSTEM	
1014	TECHNICAL EQUIPMENT TO BE DEFINED	
1015	MISSION SCHEDULE CONSOLE	
1016	SYSTEM STATUS CONSOLE	
1017	LAUNCH COORDINATOR & STATUS CONSOLE	
1018	ALARM ANALYST CONSOLE	
1019	SYSTEM DIRECTOR CONSOLE	
1020	TAPE RECORDER (VOICE)	
1021	SIMULATOR KEYSET	
1022	PRIVATE LINE ASSIGNMENT KEY PANEL	
1023	TEST BENCH	
1024	TECHNICAL EQUIPMENT TO BE DEFINED (CONTROL)	
1025	DIGITAL/ANALOG CONVERTER	
1026	SLAVE TV CONTROL UNIT	
1027	MASTER TV CONTROL UNIT	
1028	DATA DISPLAY LOGIC CABINET	
1029	SIMULATOR LOGIC	
1030	AUXILIARY EQUIPMENT TO ITEM NO. 1029	
1031	GROUND TIMING SYSTEM	
1032	WWV RECEIVER	
1033	COMMAND PROCESSOR	
1034	GENERAL PURPOSE P.A.M. (VHF) S.S. & D	
1035	VHF-43 INTERCEPT ASSEMBLY REGISTER	
1036	US T/M P.A.M. (VHF) S.S. & D	
1037	VHF DOPPLER PROCESSING EQUIPMENT	
1038	P.I.C.E. TERMINAL UNIT	
1039	P.I.C.E. TAPE SUBSYSTEMS	
1040	P.I.C.E. COMPLEX	
1041	MEMORY	
1042	CONTROL	
1043	A.P.R.	
1044	DATA SYSTEM DIRECTOR CONSOLE	
1045	DATA CONTROL CONSOLE	
1046	COMPUTER COMPLEX	
1047	1604 COMPUTER	
1048	1604 CONSOLE	
1049	1607 TAPE UNIT	
1050	924 COMPUTER & CONSOLE	
1051	1606 ADAPTER	
1052	1611 DRUM	
1053	1606 ADAPTER	
1054	1609 CARD READ PUNCH	
1055	1606 ADAPTER	
1056	1606 ANALOG PRINTER	
1057	PROGRAM INTERRUPTERS	
1058	KEYPUNCHES	
1059	P.I.C.E. HI SPEED PLOTTER	
1060	MASTER TERMINATION & SWITCHING UNIT	
1061	STATUS BOARD	

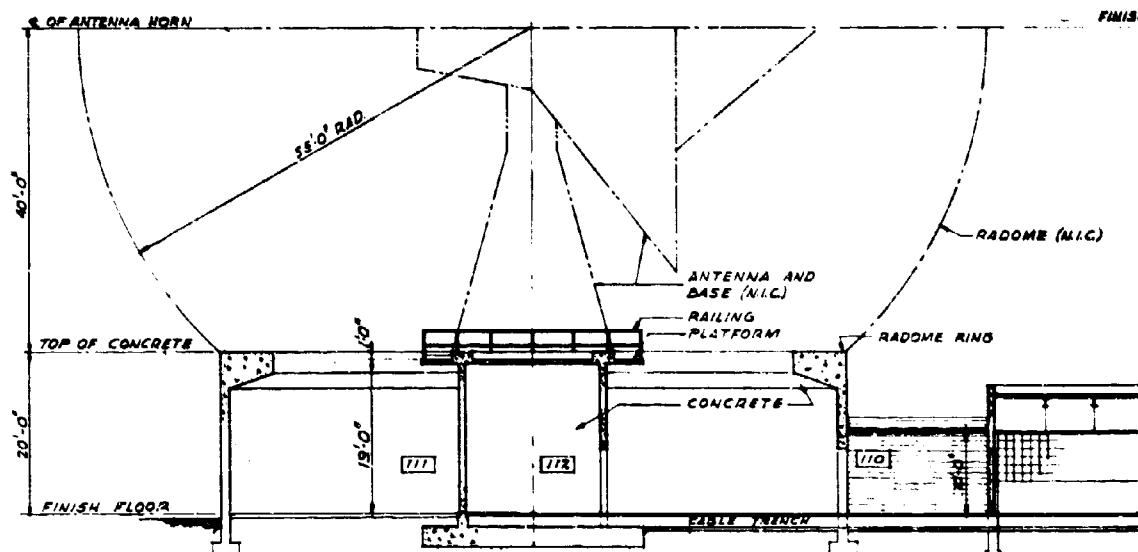
TECHNICAL COLLATERAL EQUIPMENT (N.I.C.)		
ITEM NO.	DESCRIPTION	
1062	OFFLINE CARD HANDLING EQUIPMENT	
1063	IBM 1401 PROCESSOR	
1064	CARD READ-PUNCH	
1065	PRINTER	
1066	COLLATOR	
1067	SOFTER	
1068	INTERPRETER	
1069	DUPLICATOR	
1070	DATA LINE TRANSLATOR	
1071	TELETYPE TRANSLATOR	
1072	TEST BENCH	
1073	TECHNICAL MAINTENANCE EQUIPMENT TO BE DEFINED	
1074	CARD INPUT/OUTPUT UNIT	
1075	BUFFER CONTROL UNIT	
1076	COMMUNICATIONS TRANSMISSION UNIT	
1077	#28 A 5A TELETYPEWRITER	
1078	TEST BENCH	
1079	TEST BENCH	
1080	TECHNICAL EQUIPMENT TO BE DEFINED	
1081	TEST BENCH	
1082	TEST EQUIPMENT	
1083	TEST BENCH	
1084	TEST BENCH	
1085	MOBILE TEST EQUIPMENT	
1086	TEST EQUIPMENT	
1087	GOT A TYPE SWITCHBOARD	
1088	P.O.X. EQUIPMENT	
1089	KLY TELEPHONE SYSTEM EQUIPMENT	
1090	MAIN DISTRIBUTING FRAME	
1091	TELETYPE TERMINAL EQUIPMENT	
1092	TELETYPE EQUIPMENT - TEST BAYS	
1093	SECURE TELEPHONE SYSTEM RACK	
1094	INTEREXCHANGE PRIVATE LINE EQUIPMENT	
1095	AUXILIARY POWER SUPPLY	
1096	AUTOMATIC BATTERY CHARGER	
1097	P.A. AMPLIFIER	
1098	#28 A 5A TELETYPEWRITERS	
1099	ROTARY TELETYPE UNITS	
1100	#28 READOUT ONLY	
1101	T.R. TELETYPE UNIT	
1102	HUBBING UNIT	
1103	#131 D SUBSETS (CRYPTO)	
1104	STATUS BOARD	
1105	PROJECTION COMPLEX	
1106	LAMP SWITCHING AMPLIFIERS	
1107	POWER SUPPLY	
1108	PROJECTOR CONTROL UNIT	
1109	SERVO AMPLIFIERS	
1110	TECHNICAL EQUIPMENT TO BE DEFINED (PROJECTION)	
1111	MOTOR GENERATOR	
1112	MOTOR GENERATOR CONTROL PANEL	
1113	TELEPHONE EQUIPMENT WORK BENCH	

SYMBOL	REVISION	DESCRIPTION	DATE	APPROVAL
LOCKHEED MISSILES AND SPACE DIVISION LOCKHEED AIRCRAFT CORPORATION THE RALPH M. PARSONS COMPANY <small>ARCHITECT ENGINEER LOS ANGELES CALIFORNIA</small>				
FACILITIES CRITERIA/ MIDAS TRACKING AND CONTROL CENTER CENTRAL OPERATIONS AND SYSTEM CONTROL BUILDING PERSPECTIVE AND TECHNICAL COLLATERAL EQUIPMENT LIST				
APPROVED  R. M. PARSONS <small>MANAGER SYSTEMS DIVISION</small>	1868-1/111 SCALE NONE SHEET 11 OF 15 DATE MARCH 1, 1961			

SCALE AS NOTED SHEET 12 OF 15
DATE MARCH 1, 1961



PERSPECTIVE



SECTION (A)
1/8" = 1'-0"

ANCHOR BOLT TO BE ESTABLISHED BY
DESIGNER OF THE RADOME SUPPORT STRUCTURE

DESIGN EACH BEARING PLATE FOR
THE FOLLOWING MINIMUM LOADS:
(BASED ON SQUARE GRID LOADS)
RADIAL SHEAR 18,000
BOLT TENSION 15,000
TANGENTIAL SHEAR 24,000

TOP OF PLATE TO
TOP OF CONCRETE

ANCHOR BOLT DIMENSIONS
TO BE ESTABLISHED BY
DESIGNER OF THE RADOME
SUPPORT STRUCTURE

ANCHOR BOLT
LOCATION (VERTICAL)
SIZE OF OPENING TO
BE DETERMINED DURING
FINAL DESIGN

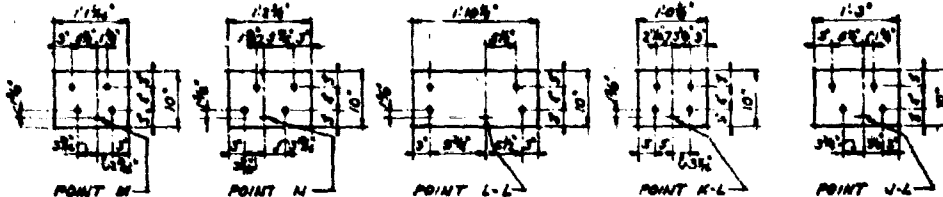
TYPICAL 5 SEGMENT
STRENGTHENING ANGLE
& EXCEPT AT POINTS
M & N
POINT K, ADJ. SEGMENT

POINT M
POINT L-L
POINT K-L
POINT J-L

POINT N
POINT L-A
POINT R-A
POINT J-A

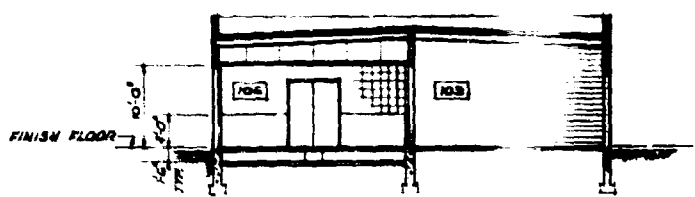
SECTION (A)

PLAN OF BASE



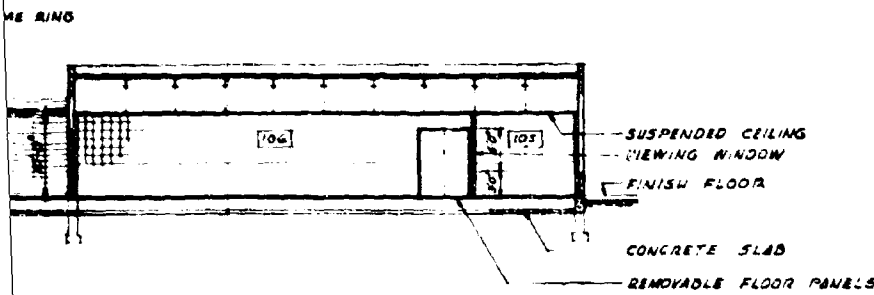
RADOME BEARING PLATES-DETAILS

1. ANCHOR BOLT AND BEARING PLATE PLACEMENT DIMENSIONS SHOWN BUT POSITION & ELEVATION, CENTER OF BEARING PLATES & BEARING PLATES LEVEL & 1/4" BETWEEN ANY TWO POINTS ON PLATE.
2. BOLT LOCATIONS BASED ON ORIGINATES CORPS, DEPT OF THE ARMY DIVISION 704 & 705 BOMBING BY DOOPEN BOMBARDIER.
3. CONNECTION DETAILS AT RADOME BASE BETWEEN BEARING PLATES TO BE DESIGNED, FURNISHED, & INSTALLED AS PART OF RADOME DESIGN AND INSTALLATION CONTRACT.
4. THE ANCHOR BOLT SHALL NOT BE WELDED OR OTHERWISE CONNECTED TO BEARING PLATES



SECTION (B)

TECHNICAL COLLATERAL EQUIPMENT (M.C.)	
ITEM NO.	DESCRIPTION
106	UNF RECEIVER
106	UNF AUTO TRACK ELECTRONICS
106	ANTENNA SLAVE DATA TERMINAL
106	UNF DOPPLER RECEIVER
106	UNF COMMAND TRANSMITTER
106	UNF RECEIVER
106	DOPE SIGHT EQUIPMENT
106	DOPPLER RECEIVER (BACK-UP)
106	DOPPLER PROCESSOR (BACK-UP)
106	WIDE BAND TAPE RECORDER
106	TECHNICAL EQUIPMENT TO BE DEFINED
106	STATUS BOARD
106	ANTENNA CONTROL DISPLAY INTERCOM STATUS CONSOLE
106	TEST DECK
106	UNF - RF MULTICOUPLER
106	P.S. AMPLIFIER



GRAPHIC SCALE
INCHES 0 1 2 3 4 5 6 7 8 9 10

LOCKHEED MISSILES AND SPACE DIVISION

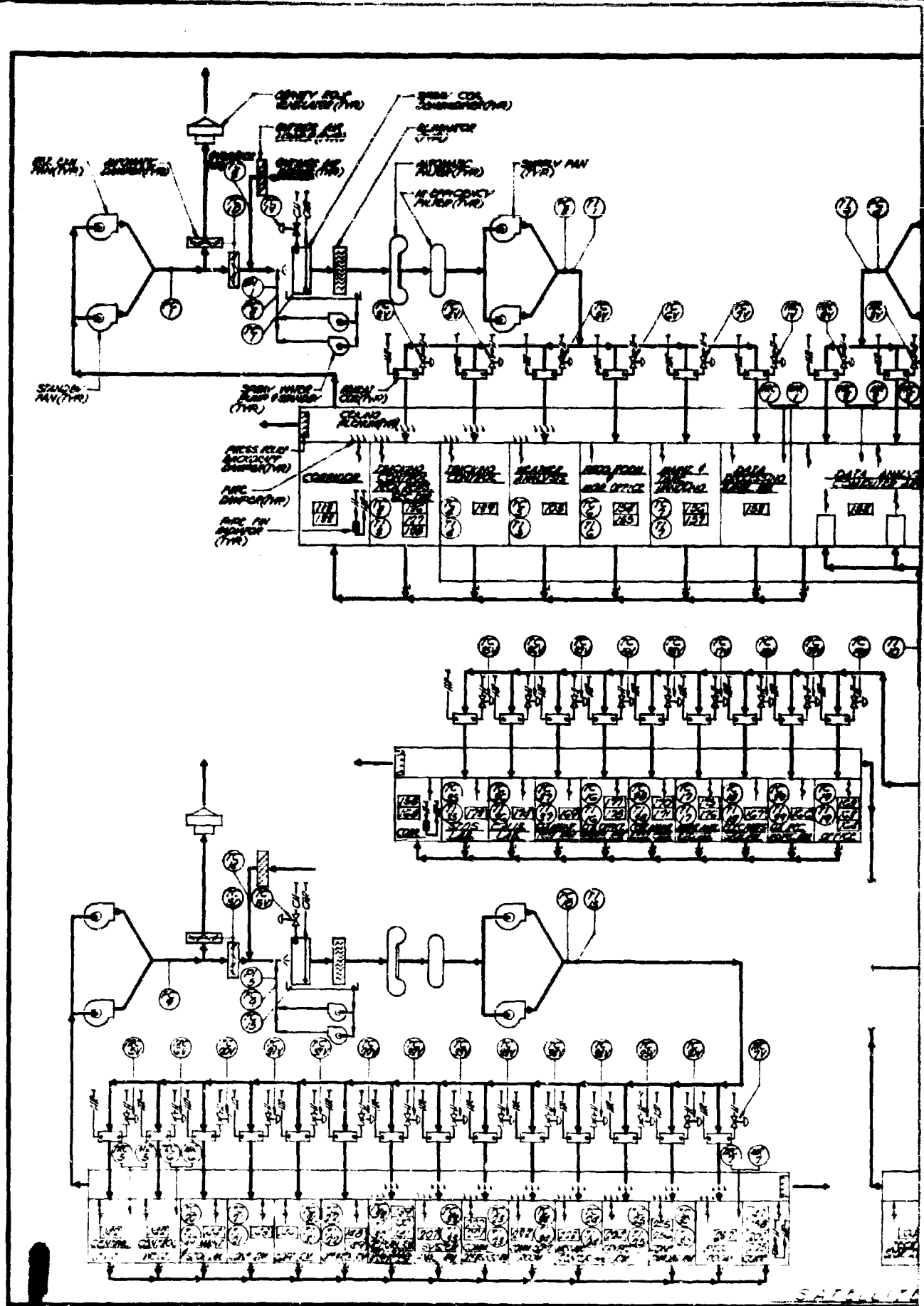
LOCKHEED AIRCRAFT CORPORATION
THE RALPH M. PARSONS COMPANY
LOS ANGELES, CALIFORNIA

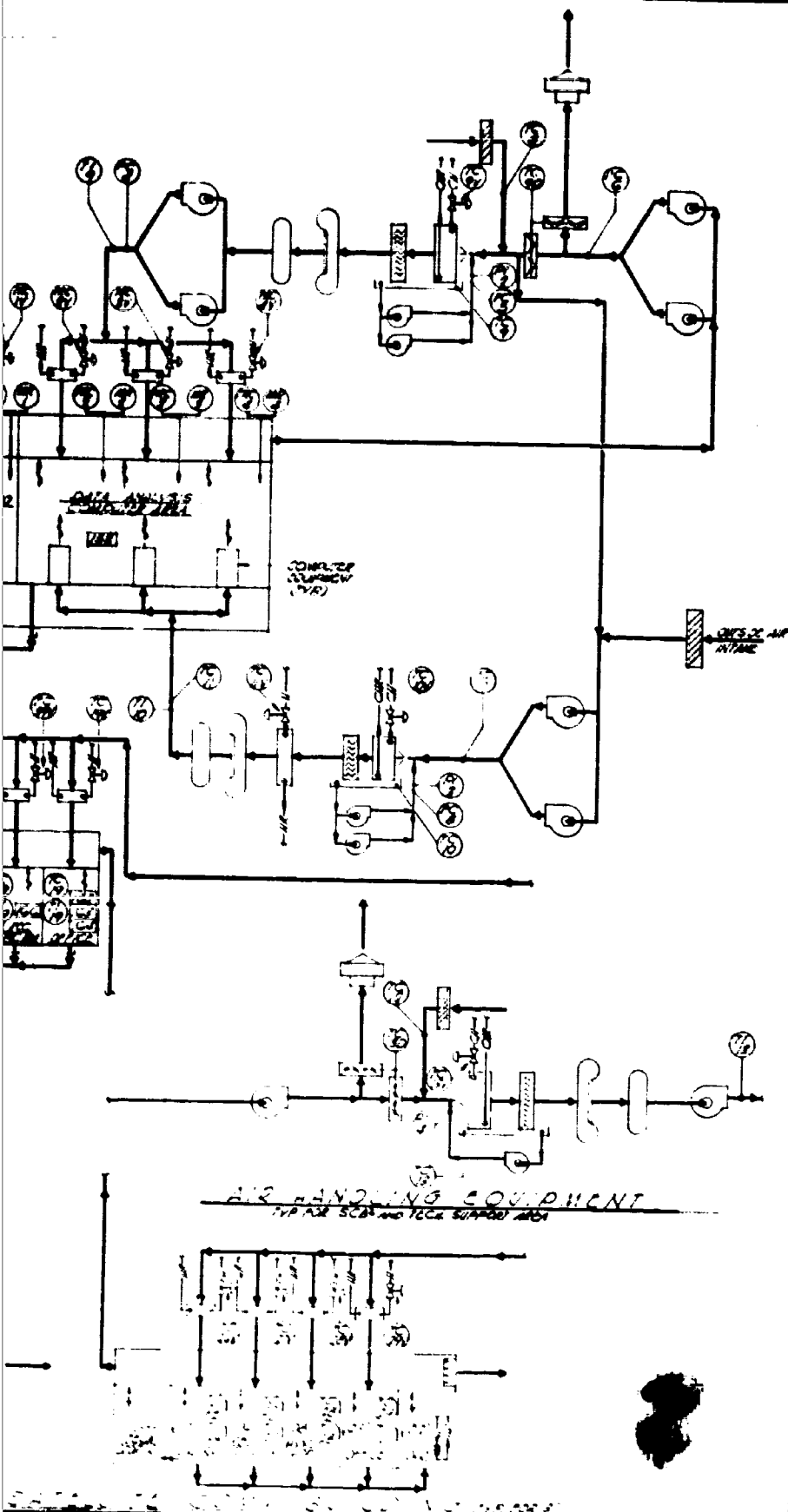
FACILITIES CRITERIA
MIDAS TRACKING AND CONTROL CENTER
SATELLITE COMMUNICATIONS BUILDING
SECTIONS, PERSPECTIVE AND TECHNICAL
COLLATERAL EQUIPMENT LIST

1868-1/113

APPROVED
DATE
BY

SCALE AS NOTED
DATE MARCH 1, 1961
SHEET 13 OF 18





SYMBOL



LEGEND

DESCRIPTION

PRESSURE SENSOR, RECORDER, OR CONTROLLER

TEMPERATURE SENSOR, RECORDER, OR CONTROLLER

PROCESS VARIABLE OR ACTUATOR

TYPE READING

ADDITIONAL FUNCTION

SHORTHAND LETTER

INSTRUMENT NUMBER

TEMPERATURE INDICATOR

TEMPERATURE CONTROLLER

TEMPERATURE RECORDER CONTROLLER

PRESSURE INDICATOR

FLOW CONTROLLER

MOISTURE RECORDER (RH/DRY)

HEAT RATED SUPPLY

HEAT RATED RETURN

CALLED RATED SUPPLY

CALLED RATED RETURN

DOOR LOWER

D-DAMPEN

V-VALVE

LOCKHEED MISSILES AND SPACE DIVISION

LOCKHEED AIRCRAFT CORPORATION

THE RALPH M. PARSONS COMPANY
ARCHITECT-ENGINEERS
LOS ANGELES, CALIFORNIA

FACILITIES CRITERIA
MISSILE TRACKING AND CONTROL CENTER
HEATING, VENTILATING AND AIR CONDITIONING
FLOW AND CONTROL DIAGRAM
TECHNICAL AREA AIR-CONDITIONING SYSTEMS

1868-1/114

SCALE NONE

SHEET 14 OF 15

DATE MARCH 1, 1961

